

The University of Jordan
Department of Chemistry
General Chemistry I (0303101)
First Midterm Exam – Fall 2015/2016

Date: 7/11/2015

Time: 60 min

Name in Arabic:

Reg. No.:

Instructor Name:

Section:

Useful data: $N_A = 6.02 \times 10^{23}/\text{mol}$; $T(\text{K}) = T(^{\circ}\text{C}) + 273$.

ANSWER SHEET

1. a ~~b~~ c ~~d~~ e

2. ~~a~~ b c d ~~e~~

3. a b c ~~d~~ ~~e~~

4. a b c d ~~e~~

5. a b c ~~d~~ e

6. ~~a~~ b c d e

7. a b c ~~d~~ e

8. a b c d ~~e~~

9. a ~~b~~ c d e

10. a b ~~c~~ d e

11. a ~~b~~ c d e

12. a b ~~c~~ d e

13. a b c d ~~e~~

14. ~~a~~ b c ~~d~~ e

15. ~~a~~ ~~b~~ c d e

16. a b ~~c~~ d e

17. a ~~b~~ c d ~~e~~

18. a b ~~c~~ d e

Q1) Which of the following represents a chemical change:

- a) Melting of solid H_2O
- c) Evaporation of liquid H_2O
- e) Condensation of H_2O vapor
- b) Separation of H_2O molecule into its atoms
- ~~d) Mixing H_2O with oil~~

Q2) The result of $(3.8621 \times 1.5630) - 5.98$ is properly written as:

- a) 0.06
- b) 0.05646
- c) 0.056462
- d) 0.0565
- ~~e) 0.056~~

Q3) how many centiliters (cL) are there in 35 microliters.

- ~~a) 3.5×10^{-4} cL~~
- b) 3.5×10^5 cL
- c) 3.5 cL
- ~~d) 3.5×10^{-3} cL~~
- e) 3.5×10^4 cL

Q4) The agreement of a particular value of measurement with the true value is called

- a) significance
- b) certainty
- c) precision
- d) error
- ~~e) accuracy~~

Q5) How many protons, neutrons, and electrons, respectively, are present in an ^{27}Al isotope?

- a) 27, 14, 13
- b) 13, 13, 14
- c) 13, 27, 13
- ~~d) 13, 14, 13~~
- e) 13, 14, 10

Q6) What is the name of $MnSO_4$?

- ~~a) manganese(II) sulfate~~
- b) manganese(IV) sulfate
- c) manganese sulfate
- d) manganese(I) sulfate
- e) manganese disulfate

Q7) Which one of the following combinations of names and formulas is incorrect?

- a) $CaCO_3$ calcium carbonate
- b) $NaClO_3$ sodium chlorate
- c) Al_3PO_4 aluminum phosphate
- ~~d) KNO_2 potassium nitrate~~
- e) MgO magnesium oxide

Q8) What is the chemical formula of diiodine pentoxide?

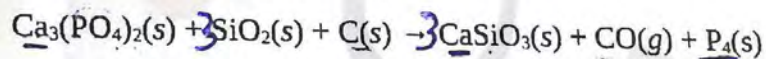
- a) $2IO_5$
- b) I_5O_2
- c) IO_5
- d) $(IO_5)_2$
- ~~e) I_2O_5~~

- Q9) How many grams of potassium are in 23.8 g of potassium dichromate, $K_2Cr_2O_7$?
- a) 2.02 g b) 6.33 g c) 4.04 g d) 3.32 g g e) 5.18 g

- Q10) The number of oxygen atoms in 10.0 g of $Ca_3(PO_4)_2 \cdot 3H_2O$ is (molar mass = 364.3 g/mol):
- a) 2.68×10^{23} b) 6.78×10^{23} c) 1.82×10^{23} d) 3.56×10^{23} e) 7.38×10^{23}

- Q11) A compound of bromine and fluorine contains 58.37 mass percent bromine. Determine its empirical formula.
- a) BrF_2 b) BrF_3 c) Br_2F_3 d) Br_3F e) BrF

Q12) Balance the following equation:



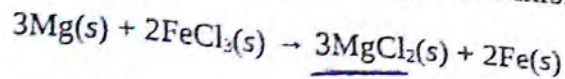
- a) $Ca_3(PO_4)_2(s) + 3SiO_2(s) + 8C(s) \rightarrow 3CaSiO_3(s) + 8CO(g) + 2P_4(s)$ ×
- b) $2Ca_3(PO_4)_2(s) + 6SiO_2(s) + 10C(s) \rightarrow 6CaSiO_3(s) + 10CO(g) + 4P_4(s)$ ×
- c) $2Ca_3(PO_4)_2(s) + 6SiO_2(s) + 10C(s) \rightarrow 6CaSiO_3(s) + 10CO(g) + P_4(s)$
- d) $Ca_3(PO_4)_2(s) + 3SiO_2(s) + 8C(s) \rightarrow 3CaSiO_3(s) + 8CO(g) + P_4(s)$
- e) $Ca_3(PO_4)_2(s) + 3SiO_2(s) + 14C(s) \rightarrow 3CaSiO_3(s) + 14CO(g) + P_4(s)$

- Q13) How many grams of sodium fluoride (NaF) are needed to form 435 g of sulfur tetrafluoride (SF_4)?



- a) 754 g b) 831 g c) 341 g d) 909 g e) 676 g

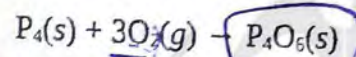
Q14) Magnesium reacts with iron(III) chloride to form magnesium chloride and iron.



A mixture of 41.0 g of magnesium (molar mass = 24.31 g/mol) and 145 g of iron(III) chloride (molar mass = 162.2 g/mol) is allowed to react. What mass of magnesium chloride, MgCl_2 , (molar mass = 95.21 g/mol) is formed

- a) 136 g b) 161 g c) 146 g d) 128 g e) 154 g

Q15) Tetraphosphorus hexaoxide, P_4O_6 , (molar mass = 219.9 g/mol) is formed by the following reaction



If a mixture of 38.7 g of oxygen (molar mass = 32 g/mol) and excess phosphorus actually produce 54.3 g of P_4O_6 , what is the percent yield for the reaction?

- a) 61.3% b) 48.8% c) 26.3% d) 77.5% e) 37.6%

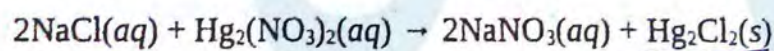
Q16) Which of the following compounds is a nonelectrolyte?

- a) KOH (aq) b) acetic acid, $\text{CH}_3\text{COOH}(aq)$ c) methanol, $\text{CH}_3\text{OH}(aq)$
d) sulfuric acid, $\text{H}_2\text{SO}_4(aq)$ e) ammonia, $\text{NH}_3(aq)$

Q17) Which of the following salts is insoluble in water?

- a) CuSO_4 b) BaCO_3 c) CaCl_2 d) $\text{Pb}(\text{NO}_3)_2$ e) $\text{Ba}(\text{OH})_2$

Q18) Select the net ionic equation for the reaction between sodium chloride and mercury(I) nitrate.



- a) $\text{Hg}_2(\text{NO}_3)_2(aq) \rightarrow \text{Hg}_2^{2+}(aq) + 2\text{NO}_3^-(aq)$
b) $\text{Na}^+(aq) + \text{NO}_3^-(aq) \rightarrow \text{NaNO}_3(aq)$
c) $\text{Hg}_2^{2+}(aq) + 2\text{Cl}^-(aq) \rightarrow \text{Hg}_2\text{Cl}_2(s)$
d) $\text{Hg}_2^{2+}(aq) \rightarrow \text{Hg}_2(s)$
e) $\text{NaCl}(aq) \rightarrow \text{Na}^+(aq) + \text{Cl}^-(aq)$

General Chem. 0303101
First Exam

16

Date: 03/04/2014
Time: 60 min...

Name:
Instructor Name:
Reg. No.:
Seat No.:

$$N_A = 6.022 \times 10^{23}, \quad ^\circ F = \left(^\circ C \times \frac{9}{5} \right) + 32, \quad K = ^\circ C + 273$$



ANSWER SHEET

- | | |
|--|---|
| 1. a <input checked="" type="radio"/> b c d e | 11. a <input checked="" type="radio"/> b <input checked="" type="radio"/> c d e |
| 2. a b c <input checked="" type="radio"/> d e | 12. a b <input checked="" type="radio"/> c d e |
| 3. a b <input checked="" type="radio"/> c d e | 13. <input checked="" type="radio"/> a b <input checked="" type="radio"/> c d e |
| 4. <input checked="" type="radio"/> a b c d e | 14. a b c d <input checked="" type="radio"/> e |
| 5. a b c d <input checked="" type="radio"/> e | 15. a b c <input checked="" type="radio"/> d e |
| 6. a b c <input checked="" type="radio"/> d e | 16. a <input checked="" type="radio"/> b c d e |
| 7. a <input checked="" type="radio"/> b c d e | 17. a b c d <input checked="" type="radio"/> e |
| 8. a b c d <input checked="" type="radio"/> e | 18. a b <input checked="" type="radio"/> c d <input checked="" type="radio"/> e |
| 9. a b <input checked="" type="radio"/> c d e | 19. <input checked="" type="radio"/> a <input checked="" type="radio"/> b c d e |
| 10. <input checked="" type="radio"/> a b c d e | 20. a b c <input checked="" type="radio"/> d e |

1. Which one of these represents a *physical* change?

- (a) apples, when exposed to air, turn brown
- (b) water, when heated, forms steam
- (c) bleach turns hair yellow
- (d) sugar, when heated, becomes brown
- (e) milk turns sour

$$0.0092$$

$$91.95 \times 10^{-4} \\ = 92.0 \times 10^{-4}$$

2. The correct answer with the right number of significant figures for the following operation is:

$$(1.50 \times 10^{-4} \times 61.3) + 2.01 =$$

1

- (a) 2.0192 (b) 2.019 (c) 2.0 (d) 2.02 (e) 2.019195

3. The SI prefixes *kilo* and *micro* represent, respectively:

- (a) 10^6 and 10^{-6} (b) 10^{-3} and 10^6 (c) 10^3 and 10^{-6} (d) 10^{-3} and 10^{-9} (e) 10^{-6} and 10^{-3}

4. Some molecules move with speed of 6.5 miles per second. What is this speed in cm/h? (1.00 mile = 1609 m)

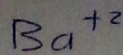
- (a) 3.8×10^9 (b) 2.6×10^9 (c) 2.0×10^9 (d) 1.1×10^6 (e) 4.1×10^9

$$\frac{6.5 \times 1609 \text{ m}}{\frac{1}{3600} \text{ h}} =$$

5. Atoms of the same element with different mass numbers are called

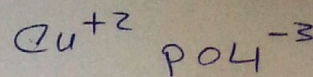
- (a) ions (b) neutrons (c) allotropes (d) chemical families (e) isotopes

6. The correct name for $Ba(OH)_2$ is



- (a) barium hydrogen oxide.
- (b) boron hydroxide.
- (c) beryllium hydroxide.
- (d) barium hydroxide.
- (e) barium hydrate.

7. Which is the correct formula for copper (II) phosphate?



- (a) Cu_2PO_4
- (b) $Cu_3(PO_4)_2$
- (c) Cu_2PO_3
- (d) $Cu(PO_4)_2$
- (e) $Cu(PO_3)_2$

8. The accurate atomic masses of the two stable isotopes of indium, $^{113}_{49}In$ and $^{115}_{49}In$ are 112.904061 and 114.90388 g/mol respectively. Knowing that the average atomic mass of indium is 114.818 g/mol, calculate the percentage of $^{113}_{49}In$.

$X_2 = 1 - X_1$ (a) 93.7% (b) 57.0% (c) 1.80% (d) 10.3% (e) 4.29%

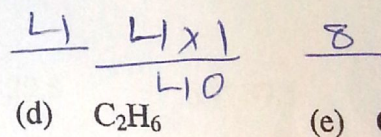
$$112.904061 X_1 + 114.90388 X_2 = 114.818$$

$$112.904061 X_1 + 114.90388 - 114.90388 X_1$$

$$-1.999819 X_1 = -0.08588$$

9. A compound was discovered whose composition by mass is 90.0% C and 10.0% H. Which of these choices could be the molecular formula of this compound?

The molar masses of H and C are (H=1.000, C=12.00)



- (a) CH_4
- (b) C_2H_4
- (c) C_3H_4
- (d) C_2H_6
- (e) C_3H_8

$\frac{4 \times 1}{10}$

$C \rightarrow 90g$
 $H \rightarrow 10g$

$n = \frac{90}{12} = 7.5$

$n = \frac{10}{1} = 10$

$C_7.5 H_{10}$

$C_{7.5} H_{10} \frac{90}{12} 7.5$

10. What is the mass, in grams, of one copper atom ($M_m = 63.55 \text{ g} \cdot \text{mol}^{-1}$)?

- (a) 1.06×10^{-22}
- (b) 9.3×10^{-23}
- (c) 7.5×10^{-23}
- (d) 8.04×10^{-21}
- (e) 1.24×10^{-22}

$\frac{1}{6.023 \times 10^{23}} = \frac{m}{63.55}$

$n = \frac{1}{6.023 \times 10^{23}}$

10.55×10^{-23}

0.166×10^{-23}

1x 27

X1 = 27x1

11. What is the mass percentage of aluminum in $KAl(SO_4)_2$?
The molar masses are (K=39.10, O=16.00, ~~C=12.00~~, S=32.00)

Al = $\frac{27}{240.1}$
 $\frac{27}{258.1}$
27

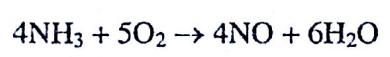
- (a) 15.38 (b) 10.43 (c) 24.73 (d) 49.46

12. A sample of Na_2CO_3 contains 3.50 moles of sodium. What is the mass of the sample (grams)? The molar masses are (O=16.00, C=12.00, Na=23.00)

- (a) 6.40 (b) 132.5 (c) 185.5 (d) 13.25 (e) 23.85

$1.75 = \frac{m}{M}$

13. Ammonia reacts with diatomic oxygen to form nitric oxide and water vapor:



When 30.0 g NH_3 and 80.0 g O_2 are allowed to react, what is the amount of NO produced (grams)? The molar masses are (O=16.00, H=1.000, N=14.00)

- (a) 52.9 (b) 26.5 (c) 11.2 (d) 29.5 (e) 37.5

$n = \frac{30}{17} = 1.76 \text{ mol} \rightarrow 0.441$
 $n = \frac{80}{32} = 2.5 \rightarrow 0.5$
 $0.441 = \frac{m}{30}$
 $0.441 = \frac{m}{30}$

14. Which of these compounds is a nonelectrolyte?

- (a) NaF (b) HNO_3 (c) CH_3COOH (d) NaOH (e) $C_6H_{12}O_6$ (glucose)

15. Based on the solubility rules, which one of these compounds should be insoluble in water?

- (a) Na_2SO_4 (b) $CuSO_4$ (c) $MgSO_4$ (d) $BaSO_4$ (e) $ZnSO_4$

16. Which of these choices is the correct *net ionic equation* for the reaction that occurs when solutions of $\text{Pb}(\text{NO}_3)_2$ and NH_4Cl are mixed?

- (a) $\text{NH}_4^+(\text{aq}) + \text{NO}_3^-(\text{aq}) \rightarrow 2\text{NH}_4\text{NO}_3(\text{s})$
- (b) $\text{Pb}^{2+}(\text{aq}) + 2\text{Cl}^-(\text{aq}) \rightarrow \text{PbCl}_2(\text{s})$
- (c) $\text{Pb}(\text{NO}_3)_2(\text{aq}) + 2\text{NH}_4\text{Cl}(\text{aq}) \rightarrow \text{NH}_4\text{NO}_3(\text{aq}) + \text{PbCl}_2(\text{s})$
- (d) $\text{Pb}^{2+}(\text{aq}) + 2\text{NO}_3^-(\text{aq}) + 2\text{NH}_4^+(\text{aq}) + 2\text{Cl}^- \rightarrow 2\text{NH}_4^+(\text{aq}) + 2\text{NO}_3^-(\text{aq}) + \text{PbCl}_2(\text{s})$
- (e) No reaction occurs when the solutions are mixed.

17. How many grams of sodium are in 500 mL of 0.600 M Na_2CO_3 (aq) solution? The molar masses are (Na=23.00, C=12.00, O=16.00)

- (a) 6.90
- (b) 13.1
- (c) 11.9
- (d) 10.4
- (e) 13.8

Handwritten calculations for question 17:

$$M = \frac{n}{V} \Rightarrow 0.6 = \frac{n}{0.5} \Rightarrow n = 0.3$$

$$M = \frac{n}{V} \Rightarrow 0.3 = \frac{n}{0.5} \Rightarrow n = 0.15$$

$$0.3 = \frac{m}{106} \Rightarrow m = 31.8$$

Final calculation: $31.8 \times 2 = 63.6$ (Note: The handwritten work shows 300, which appears to be a miscalculation or a different path.)

18. Which one of these equations describes a *redox* reaction?

- (a) $2\text{KBr}(\text{aq}) + \text{Pb}(\text{NO}_3)_2(\text{aq}) \rightarrow 2\text{KNO}_3(\text{aq}) + \text{PbBr}_2(\text{s})$
- (b) $\text{CO}_3^{2-}(\text{aq}) + \text{HSO}_4^-(\text{aq}) \rightarrow \text{HCO}_3^-(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$
- (c) $2\text{Al}(\text{s}) + 3\text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{Al}_2(\text{SO}_4)_3(\text{aq}) + 3\text{H}_2(\text{g})$
- (d) $\text{CaBr}_2(\text{aq}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{CaSO}_4(\text{s}) + 2\text{HBr}(\text{g})$
- (e) $\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l})$

19. A 34.62 mL of 0.1510 M NaOH was needed to neutralize 75.0 mL of an H_2SO_4 solution. What is the concentration of the sulfuric acid solution (M)?

- (a) 0.03478
- (b) 0.075
- (c) 0.131
- (d) 0.209
- (e) 0.0523

Handwritten calculations for question 19:

$$M_1 V_1 = M_2 V_2$$

$$0.1510 \times 34.62 = M_2 \times 75.0$$

$$M_2 = \frac{0.1510 \times 34.62}{75.0} = 0.075$$

20. The temperature of a metal bar is 50°C , what is the temperature in $^\circ\text{F}$?

- (a) 230
- (b) 0.075
- (c) 86
- (d) 122
- (e) 194

Handwritten calculation for question 20:

$$F^\circ = \frac{9}{5} C^\circ + 32$$

$$= \frac{9}{5} 50 + 32 = 90 + 32 = 122$$

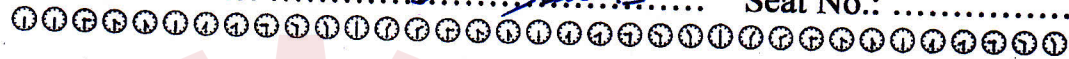
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General Chem. 101
First Exam

Date: 3/4/2013
Time: 60 min

Name: *جعفر محمد عبد الرحمن* Reg. No.: *0129415*

Instructor Name: *د. منير حبيب* Seat No.:



$N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$

(For molar masses always use the provided periodic table)



ANSWER SHEET

1. a b c d ~~e~~

9. ~~a~~ b c d e

2. a ~~b~~ c d e

10. a b ~~c~~ d e

3. a b c ~~d~~ e

11. ~~a~~ b c d e

4. ~~a~~ b c d e

12. a ~~b~~ c d e

5. a b ~~c~~ d e

13. a ~~b~~ c ~~d~~ e

6. a ~~b~~ c d e

14. a b c d ~~e~~

7. a b c d ~~e~~

15. a b ~~c~~ d e

8. a b c ~~d~~ e

16. a ~~b~~ c d e

17. a b c d ~~e~~

اللجنة الأكاديمية في قسم هندسة الطبائيك - الجامعة الأردنية

1. Perform the following operations and choose the answer with the correct number of significant figures

$$\begin{array}{r} 4 \qquad \qquad 3 \\ (5.673 \times 3.42) + 2.0 \\ 19.4 \quad + 2.0 \end{array}$$

- a) 20.4 b) 2.0×10^1 c) 21.41 d) 21.412 e) 21.4

2. Convert 3.78×10^5 mg to pound (lb). (1 lb = 453.6 g)

$$\begin{array}{l} 3.78 \times 10^5 \text{ mg} \times \frac{1 \text{ lb}}{453.6 \text{ g}} \times \frac{1 \text{ g}}{1000 \text{ mg}} \\ \textcircled{3} \frac{3.78 \times 10^5}{453.6} = 8.34 \times 10^1 = 0.833 \end{array}$$

- a) 0.0833 b) 0.833 c) 8.33 d) 83.3 e) 833

3. Sugar is an example of a(n):

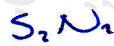
- a) element b) homogeneous mixture c) heterogeneous mixture
d) compound e) physical property

4. The name of Na_2HPO_4 is:

- a) Sodium hydrogenphosphate b) Sodium phosphate c) Sodium (II) phosphate
d) Sodium perphosphate e) Disodium hydrogenphosphate

5. Write the formula of disulfur dinitride:

- a) S_2N b) S_3N_2 c) S_2N_2 d) S_4N_2 e) $\text{S}_4(\text{NO})_4$



ClO_2^- ite \rightarrow oys

6. The name of HClO_2 is:

- a) Hydrochloric acid b) Chlorous acid c) Chloric acid
d) Perchloric acid e) Hypochlorous acid

7. An element (X) has two isotopes that exist in nature in the following masses and relative abundances: ^{28}X (mass = 27.977⁵ amu, abundance = 92.223%) and ^{29}X \rightarrow 2530.1 (mass = 28.976⁵ amu, abundance = 7.777%). The average atomic mass (in amu) of the element X is: 28.054

- a) 27.977 b) 28.098 c) 28.976 d) 28.000 e) 28.055

8. Which of the following atoms has the same number of protons, neutrons and electrons?

- a) $^{37}_{17}\text{Cl}$ b) $^{35}_{17}\text{Cl}$ c) $^{22}_{12}\text{Mg}$ d) $^{24}_{12}\text{Mg}$ e) $^{47}_{24}\text{Cr}$
17, 20 18, 17 10, 12 12, 12 23, 24

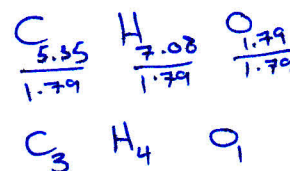
9. What is the mass of one argon (^{36}Ar) atom in grams? Given that the atomic mass of argon is 35.968 amu and Avogadro's number is $6.02 \times 10^{23} \text{ mol}^{-1}$.

- a) 5.97×10^{-23} b) 5.9748×10^{-22} c) 5.97×10^0
d) 1.6737×10^{22} e) 1.67×10^{22}

$$n = \frac{\text{mass}}{m_n} \quad , \quad n = \frac{N_0}{A_r} = \frac{1}{6.02 \times 10^{23}} = 0.166 \times 10^{-23} \text{ mol}$$

$$0.166 \times 10^{-23} (35.968) = 5.97 \times 10^{-23}$$

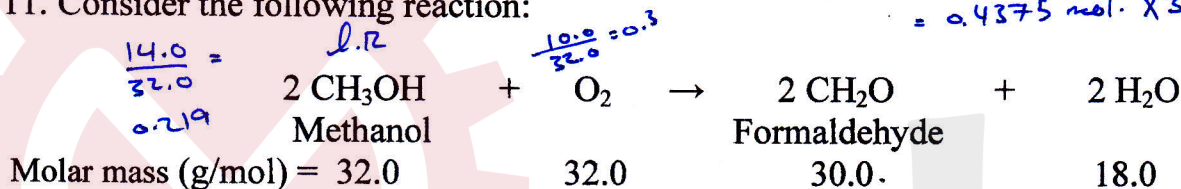
$$\begin{aligned} \% C = 64.3\% &\rightarrow \frac{64.3 \text{ g}}{12.011} = 5.35 \text{ mol} \\ \% H = 7.14\% &\rightarrow \frac{7.14 \text{ g}}{1.0079} = 7.08 \text{ mol} \\ \% O = 28.6\% &\rightarrow \frac{28.6 \text{ g}}{15.999} = 1.79 \text{ mol} \end{aligned}$$



10. An unknown organic compound was analyzed and the mass percent of the constituent atoms were: 64.3% carbon; 7.14% hydrogen; 28.6% oxygen. The empirical formula of this compound is

- a) $C_3H_4O_2$ b) C_6H_3O c) C_3H_4O d) C_3H_6O e) $C_3H_6O_2$

11. Consider the following reaction:



$$\begin{aligned} \frac{1}{2} \text{ mol CH}_3\text{OH} &\rightarrow \frac{1}{2} \text{ mol CH}_2\text{O} \\ 0.4375 &\rightarrow ? \\ &= 0.4375 \text{ mol} \times 30.0 = 13.125 \text{ g} \end{aligned}$$

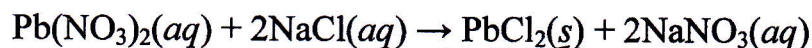
In a test, 14.0 g of methanol and 10.0 g of oxygen were put into the reaction. The amount (in g) of formaldehyde that can be produced by this mixture is:

- a) 13.1 b) 14.1 c) 6.55 d) 7.50 e) 15.0

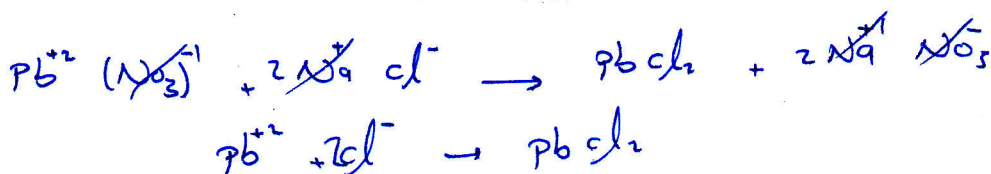
12. Which of the following solutions has the least electrical conductance?

- a) $KNO_3(aq)$ b) sucrose, $C_{12}H_{22}O_{11}(aq)$ c) $NaCl(aq)$
d) $LiOH(aq)$ e) $H_2SO_4(aq)$

13. In the following reaction, what are the spectator ions?



- a) $Na^+(aq)$, $Cl^-(aq)$ b) $Pb^{2+}(aq)$, $Cl^-(aq)$ c) $Pb^{2+}(aq)$, $NO_3^-(aq)$
d) $Na^+(aq)$, $NO_3^-(aq)$ e) $NO_3^-(aq)$, $Cl^-(aq)$



$$\boxed{5 = +6}$$

$$25 = 12$$

$$25 + 2 + -4 = 0$$

$$2 + 25 + (-2)7 = 0$$

14. Calculate the oxidation number of sulfur, S, in the formula: $\text{Na}_2\text{S}_2\text{O}_7$.

- a) -2 b) +2 c) +4 d) +5 e) +6

15. How much of 1.20 M NaOH will be needed to neutralize 168 mL of 3.0 M H_2SO_4 ?
 $\text{H}_2\text{SO}_4(\text{aq}) + 2\text{NaOH}(\text{aq}) \rightarrow 2\text{H}_2\text{O}(\text{l}) + \text{Na}_2\text{SO}_4(\text{aq})$

- a) 1.8 L b) 0.42 L c) 0.84 L d) 0.90 L e) 1.1 L

$$1 \text{ H}_2\text{SO}_4 \rightarrow 2 \text{ NaOH}$$

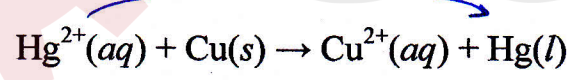
$$0.504 \rightarrow 2.4 \times 2$$

$$1 \text{ M } \text{H}_2\text{SO}_4 = 2 \text{ M } \text{NaOH}$$

$$0.504 \rightarrow 2.4 \text{ L}$$

$$1.008$$

16. The oxidizing agent in the following redox reaction is,



- a) $\text{Hg}(\text{l})$ b) $\text{Hg}^{2+}(\text{aq})$ c) $\text{Cu}^{2+}(\text{aq})$ d) $\text{Cu}(\text{s})$ e) $\text{Hg}^{2+}(\text{aq})$ and $\text{Cu}^{2+}(\text{aq})$

17. In balancing the following reaction in a acidic medium



The of coefficients of As_2O_3 is

- a) 12 b) 6 c) 2 d) 3 e) 1

$$12e^- + 12\text{H}^+ + \text{As}_2\text{O}_3 \rightarrow 2\text{AsH}_3 + 3\text{H}_2\text{O}$$

$$6\text{Zn} + 6\text{H}^+ \rightarrow 6\text{Zn}^{2+} + 6e^-$$

$$12\text{H}^+ + \text{As}_2\text{O}_3 + 6\text{Zn} \rightarrow 2\text{AsH}_3 + 3\text{H}_2\text{O} + 6\text{Zn}^{2+}$$

$$\boxed{12 = 12}$$

$$12e^- + 12\text{H}^+ + \text{As}_2\text{O}_3 \rightarrow 2\text{AsH}_3 + 3\text{H}_2\text{O}$$

$$\text{H}_2\text{O} + \text{Zn} + 2\text{H}^+ \rightarrow \text{Zn}^{2+} + \text{H}_2\text{O}$$

General Chemistry 101

First Semester 2011/2012

First Exam.

Date: 30/10/2011

Time: 60 min.

Student Name: Reg. No.:

Instructor's Name: Section: Seat No.:



Answer Sheet

1- a b c d e 9- a b c d e

2- a b c d e 10- a b c d e

3- a b c d e 11- a b c d e

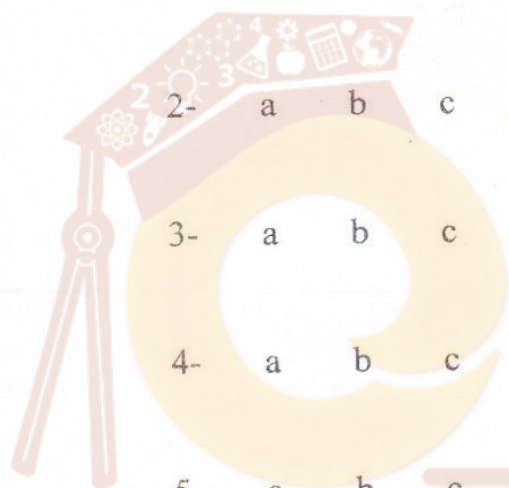
4- a b c d e 12- a b c d e

5- a b c d e 13- a b c d e

6- a b c d e 14- a b c d e

7- a b c d e 15- a b c d e

8- a b c d e 16- a b c d e



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Answer each of the following questions and put "X" on the correct choice on front page.

1- Which of the following is an intensive property?

- a) length b) area c) density d) energy e) weight

2. Carry out the following operation and report the result to the correct number of significant figures:

$$[(1.00 - 0.01) \times 2.500] \div 12.0$$

- a) 0.20625 b) 0.2063 c) 0.206 d) 0.21 e) 0.2

3. The speed of a car is 32.0 mile/hr. What is its speed in m/s?

(given: 1 mile = 1609 m)

- a) 14.3 b) 16.1 c) 18.8 d) 20.6 e) 71.6

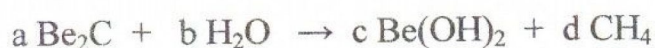
4. The formula of iron(III) phosphate is:

- a) Fe_2PO_4 b) FePO_3 c) $\text{Fe}_2(\text{PO}_4)_3$ d) $\text{Fe}_3(\text{PO}_4)_3$ e) FePO_4

5. For the isotope ${}^{59}_{27}\text{X}$. The number of protons and neutrons in that isotope are:

- a) 27 and 59 b) 27 and 32 c) 32 and 27 d) 59 and 27 e) 32 and 59

10. Balance the following equation:



The ratio of coefficients b/d in the balanced equation is:

- a) 1/2 b) 2/1 c) 1/4 d) 3/1 e) 4/1

11. 13.5 g of Li(s) was reacted with 14.85 g of $\text{N}_2(\text{g})$ according to the equation:

$$\text{N}_2(\text{g}) + 6 \text{Li}(\text{s}) \rightarrow 2 \text{Li}_3\text{N}(\text{s})$$

If the actual yield is 11.6 g, what is the percent yield of this reaction ?

Atomic masses: Li = 6.942 and N = 14.01.

- a) 51.4 b) 28.6 c) 66.3 d) 41.8 e) 70.2

12. Which of the following compounds is insoluble in water?

- a) Na_2CO_3 b) FeCO_3 c) $(\text{NH}_4)_2\text{CO}_3$ d) Na_2S e) AgNO_3

13. Which of the following reactions is an acid-base reaction?

- a) $\text{NaCl}(\text{aq}) + \text{AgNO}_3(\text{aq}) \rightarrow \text{AgCl}(\text{s}) + \text{NaNO}_3(\text{aq})$
b) $\text{Cl}_2(\text{g}) + 2\text{HI}(\text{g}) \rightarrow 2\text{HCl}(\text{g}) + \text{I}_2(\text{g})$
c) $\text{Ba}(\text{OH})_2(\text{aq}) + \text{Na}_2\text{SO}_4(\text{aq}) \rightarrow \text{BaSO}_4(\text{s}) + 2\text{NaOH}(\text{aq})$
d) $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g}) + \text{CO}_2(\text{g})$
e) $\text{Na}_2\text{CO}_3(\text{s}) + 2 \text{HCl}(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g}) + 2 \text{NaCl}(\text{aq})$

14. Balance the following redox reaction in acidic solution:



The ratio of coefficients d / c in the balanced equation is:

- a) 10 / 2 b) 7 / 3 c) 2 / 10 d) 2 / 5 e) 5 / 2

15. What is the volume of 0.910 M $\text{Ba}(\text{OH})_2$ solution needed to titrate 25.0 mL of 1.500M H_3PO_4 to produce $\text{Ba}_3(\text{PO}_4)_2$?

- a) 79.2 mL b) 92.2mL c) 52.0mL d) 61.8mL e) 69.4mL

16. When excess Na_2SO_4 solution was added to 20.0 mL of an unknown solution containing Ca^{2+} ion, 0.0472 g of CaSO_4 precipitated. What is the molar concentration of Ca^{2+} in the unknown solution?

(Molar mass of $\text{CaSO}_4 = 136.14 \text{ g/mol}$)

- a) 1.36×10^{-2} b) 1.73×10^{-2} c) 2.10×10^{-2} d) 2.47×10^{-2} e) 3.83×10^{-2}

General Chem. 101
First Exam

Time: 60 min.

Date: 14/11/2009

Student's Name:

Reg. No.

Section No.

Seat No.

#####@@@@@@@@@@@@@@@@@@@@#####

Use the following information: Atomic mass (amu): C = 12.0; H = 1.00; O = 16.0; S = 32.0; Al = 27.0; N = 14.0; Na = 23.0; Avogadro's no. = 6.022×10^{23} ; $^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times (5/9)$.

@@@@@@@@@@@@@@@@@@@@#####

ANSWER SHEET

1. a b **c** d e 9. **a** b c d e

2. **a** b c d e 10. a b c d e

3. **a** b c d **e** 11. a b c **d** e

4. a b c d e 12. **a** b c d e

5. a b c d e 13. a b c d e

6. a b c d e 14. a b **c** d e

7. a b **c** d e 15. **a** b c d e

8. **a** b c d e 16. a b c d e



1- Perform the following calculation and give the answer rounded to the correct number of significant figures

$$(3.28 + 2.8395) (1.00 + 4.5) / 23.95$$

- a- 1.4054 b - 2 c- 1.4 d- 1.420 e- 1.42

2- Convert $(-10)^\circ\text{C}$ to Fahrenheit scale of temperature.

- a- 14 b- 23.3 c- 263.15 d- 42.2 e- 32.3

3- The atomic mass of ^{35}Cl and ^{37}Cl are 34.968 amu and 36.956 amu, respectively. Calculate the natural abundance of ^{35}Cl . Given that the average atomic mass of Cl is 35.46 amu.

- a- 24.75% b- 98.61% c- 1.39% d- 51.65% e- 75.25%

4- After balancing the following reaction,



The ratio (x / y) is equal to

- a- 3 / 2 b- 4 / 2 c- 2 / 2 d- 6 / 2 e- 2 / 6

5- The correct name for $\text{Ni}(\text{BrO}_4)_2$ is: (Ni is a transition metal element)

- a- Nickel (II) bromate b- Nickel (II) bromite c- Nickel (II) perbromate
d- Nickel (IV) perpromate e- Nickel dibromate

6- The correct name for SO_3 is

- a- Sulfur trioxide b- Sulfur (IV) oxide c- Sulfur monoxide
d- Sulfur dioxide e- Sulfur oxide

7- How many sodium ions are contained in 9.96 mg (milligram) of Na_2SO_3 ? The molar mass of Na_2SO_3 is 126.05 g/mol.

- a- 1.52×10^{27} b- 4.76×10^{20} c- 9.52×10^{19}
d- 1.05×10^{21} e- 9.52×10^{20}

8- The mass percent of sulfur in $\text{Al}_2(\text{SO}_4)_3$ is equal to

- a- 28.1% b- 9.37% c- 42.7% d- 21.4% e- 36.0%

9- The empirical formula for a compound that contains 52.14% C, 13.13% H and 34.73% O is

- a- $\text{C}_2\text{H}_6\text{O}$ b- CHO c- $\text{C}_4\text{H}_{13}\text{O}_2$ d- CH_4O_2 e- CH_3O

10- Consider the following balanced reaction. How many grams of water are required to form 56.9 g of HNO_3 ? Assume that there is excess NO_2 present.



- a- 38.0 g b- 10.9 g c- 43.4 g d- 21.7 g e- 8.13 g

11- Determine the limiting reactant (LR) and the mass (in g) of nitrogen that can be produced from the reaction of 50.0 N_2O_4 with 45.0g N_2H_4 assuming 100% yield. The molar masses are as follows: $\text{N}_2\text{O}_4 = 92.02\text{g/mol}$, $\text{N}_2\text{H}_4 = 32.05\text{g/mol}$.



- a- LR is N_2H_4 , 59.0 g N_2 formed b- LR is N_2O_4 , 105 g N_2 formed
c- LR is N_2H_4 , 13.3 g N_2 formed d- LR is N_2O_4 , 45.7 g N_2 formed
e- Both reactants are in appropriate stoichiometric ratios and 45.0 g N_2 formed

12- All of the following compounds are soluble in water except

- a- Hg_2Cl_2 b- KCl c- NH_4Cl d- CuCl_2 e- $\text{Ba}(\text{OH})_2$

13- Which of the following conversions involves oxidation

- a- $\text{BF}_3 \rightarrow \text{BF}_4$ b- $\text{SO}_2 \rightarrow \text{CaSO}_3$
c- $\text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O}$ d- $\text{H}_2(\text{g}) \rightarrow \text{H}_2(\text{l})$
e- $\text{Ti}^{3+} \rightarrow \text{TiO}^{+2}$

14- The net ionic equation for the reaction of nitrous acid with lithium hydroxide is

- a- $\text{HNO}_2(\text{aq}) + \text{LiOH}(\text{aq}) \rightarrow \text{LiNO}_2(\text{aq}) + \text{H}_2\text{O}(\text{l})$
b- $\text{HNO}_2(\text{aq}) + \text{LiOH}(\text{aq}) \rightarrow \text{Li}^+(\text{aq}) + \text{NO}_2^-(\text{aq}) + \text{H}_2\text{O}(\text{l})$
c- $\text{HNO}_2(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{NO}_2^-(\text{aq}) + \text{H}_2\text{O}(\text{l})$
d- $\text{H}^+(\text{aq}) + \text{NO}_2^-(\text{aq}) + \text{Li}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{Li}^+(\text{aq}) + \text{NO}_2^-(\text{aq}) + \text{H}_2\text{O}(\text{l})$
e- $\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l})$

15- After balancing the following chemical reaction in Basic solution, the correct ration of (I^- / OH^-) is



a- 6/8

b- 8/10

c- 4/3

d- 4/2

e- 2/3

16- The volume in milliliters (ml) of 0.675 M NaOH required to neutralize 25.0 ml of 0.145 M H_3PO_4 is equal to

a- 16.1

b- 10.7

c- 13.2

d- 5.37

e- 16.9

General Chem. 101
First Exam

Date: 28/3/2009
Time: 60 min.

Name: Reg. No.:

Instructor Name: Seat No.:



$$^{\circ}\text{F} = (^{\circ}\text{C} \times \frac{9}{5}) + 32, \quad \text{K} = ^{\circ}\text{C} + 273$$



ANSWER SHEET

- | | | | | | | | | | | | |
|----|---|---|---|---|---|-----|---|---|---|---|---|
| 1. | a | b | c | d | e | 9. | a | b | c | d | e |
| 2. | a | b | c | d | e | 10. | a | b | c | d | e |
| 3. | a | b | c | d | e | 11. | a | b | c | d | e |
| 4. | a | b | c | d | e | 12. | a | b | c | d | e |
| 5. | a | b | c | d | e | 13. | a | b | c | d | e |
| 6. | a | b | c | d | e | 14. | a | b | c | d | e |
| 7. | a | b | c | d | e | 15. | a | b | c | d | e |
| 8. | a | b | c | d | e | 16. | a | b | c | d | e |

1. Perform the following calculation and give the answer rounded to the correct number of significant figures

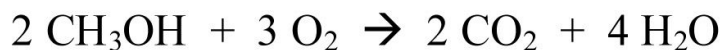
$$(15.562 - 15.512) \times 100.0$$

- a) 5 b) 5.0 c) 5.5 d) 5×10^0 e) 5.0×10^1
2. Convert 3.6×10^{-2} g/L to mg/cm^3 .
- a) 3.6×10^2 b) 3.6×10^{-1} c) 3.6×10^{-2}
d) 3.6×10^{-5} e) 3.6×10^{-3}
3. The boiling point of a liquid substance is 77.0 K. What is this temperature in Fahrenheit?
- a) -321 b) -289 c) -353 d) 139 e) 171
4. Which is the correct formula for copper(II) phosphate?
- a) Cu_2PO_4 b) $\text{Cu}_3(\text{PO}_4)_2$ c) Cu_2PO_3
d) $\text{Cu}(\text{PO}_4)_2$ e) $\text{Cu}(\text{PO}_3)_2$
5. Which of these choices is the formula for bromous acid?
- a) KBr b) HBr c) HBrO d) HBrO_2 e) HBrO_3
6. Calculate the number of moles of copper in 2.50 kg copper
- a) 39.5 b) 3.93×10^{-2} c) 3.93 d) 39.7 e) 39.3

7. A compound containing only oxygen and chlorine is 53.0 % oxygen by mass. What is the empirical formula?

- a) ClO b) Cl₂O c) ClO₂ d) Cl₂O₅ e) Cl₂O₃

8. Methanol burns up in air according to



What mass of methanol should burn to produce 165 g H₂O?

- a) 147 b) 165 c) 393 d) 73.3 e) 1.4×10^2

9. According to the reaction



If 0.670 g NO reacts with 0.740 g O₃, how many grams of NO₂ will be produced?

- a) 1.41 b) 0.709 c) 1.07 d) 0.709 e) 0.740

10. Given $6\text{Li}_{(s)} + \text{N}_{2(g)} \rightarrow 2 \text{Li}_3\text{N}_{(s)}$. If 12.3 g of Li react with 33.6 g of N₂ to produce 14.0 g Li₃N calculate the percent yield

- a) 16.7 b) 85.0 c) 68.0 d) 55.0 e) 54.0

11. Based on the solubility rules, which of these processes will occur if solutions of CuSO_{4(aq)} and BaCl_{2(aq)} are mixed?

- a) CuCl₂ will precipitate; Ba²⁺ and SO₄²⁻ are spectator ions.
b) CuSO₄ will precipitate; Ba²⁺ and Cl⁻ are spectator ions.
c) BaSO₄ will precipitate; Cu²⁺ and Cl⁻ are spectator ions.
d) BaSO₄ will precipitate; Cu²⁺ and SO₄²⁻ are spectator ions.
e) No precipitate will form.

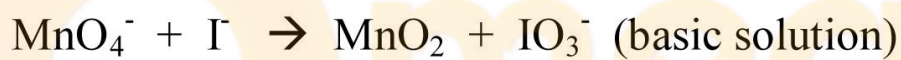
12. The oxidation number of N in NaNO_3 is

- a) +6 b) +5 c) +3 d) -3 e) -5

13. Which of these equations does *not* represent an oxidation-reduction reaction?

- a) $3 \text{Al} + 6 \text{HCl} \rightarrow 3 \text{H}_2 + \text{AlCl}_3$
b) $2 \text{H}_2\text{O} \rightarrow 2 \text{H}_2 + \text{O}_2$
c) $2 \text{NaCl} + \text{Pb}(\text{NO}_3)_2 \rightarrow \text{PbCl}_2 + 2 \text{NaNO}_3$
d) $2 \text{NaI} + \text{Br}_2 \rightarrow 2 \text{NaBr} + \text{I}_2$
e) $\text{Cu}(\text{NO}_3)_2 + \text{Zn} \rightarrow \text{Zn}(\text{NO}_3)_2 + \text{Cu}$

14. Complete and balance the following redox equation in a basic medium. What is the coefficient of OH^- when the equation is balanced using the set of smallest whole-number coefficients?



- a) 1 b) 2 c) 4 d) 10 e) none of these

15. Calculate the mass of MgCl_2 in grams required to prepare 5.00×10^2 mL of a 2.80 M MgCl_2 solution.
(Molar mass of $\text{MgCl}_2 = 95.2$ g/mol)

- a) 133 b) 160 c) 106 d) 66.5 e) 84.8

16. How many milliliters (mL) of a 0.276 M HNO_3 are needed to neutralize completely 125 mL of 0.0120 M $\text{Ba}(\text{OH})_2$ solution?

- a) 35.5 b) 15.0 c) 1.15 d) 5.43 e) 10.9