12

General Chem. 101
First Exam

Date: 29/3/2012
Time: 70 min.

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اثنين ، ١٢ بعاد

$$^{o}F = (^{o}C \times \frac{9}{5}) + 32 \quad , \quad K = {}^{o}C + 273.15$$

ANSWER SHEET

1.	a	b	**c**	d	e	10.	a	b	**c**	d	e
2.	a	**b**	c	d	e	11.	a	**b**	c	d	e
3.	a	b	c	**d**	e	12.	**a**	b	c	d	e
4.	a	b	**c**	d	e	13.	**a**	b	c	d	e
5.	~~a~~	b	c	d	**e**	14.	a	b	~~c~~	**d**	e
6.	a	~~b~~	c	d	**e**	15.	a	b	**c**	d	~~e~~
7.	a	b	**c**	d	e	16.	a	~~b~~	c	d	**e**
8.	a	b	c	d	**e**	17.	a	b	**c**	d	e
9.	a	b	c	**d**	e	18.	a	**b**	c	d	~~e~~

GOOD LUCK

GOOD LUCK

1) Express the temperature 122 °F in K. (0°C=273.15K)
a) 341 b) 50.0 c) 323 d) 493 e) 221

$C = \frac{5}{9}(F-32)$ $K = C + 273$

$= 50$ $=$

2) The answer to the expression: { [(0.04616 x 0.082057 x 293.30)/0.654] + 0.246} rounded to the proper number of significant figures is:
a) 1.945 b) 1.94 c) 1.96 d) 1.69870 e) 1.946

3) The volume of an atom is $5.44 \times 10^{-23} cm^3$. express this value in nm^3.
(1m=1 x 10^2cm) (1m=1 x 10^9nm)
a) 5.44×10^{1} b) 5.44×10^{-19} c) 2.35×10^{-15} d) 5.44×10^{-2} e) 1.81×10^{-9}

4) The name of the compound HNO_2 is:
a) hydrogen nitrite b) nitric acid c) nitrous acid d) hydrogen nitrate e) hyponitrous acid

5) How many sulfur atoms are there in 5.00 g of $Al_2(SO_4)_3$? (M.M.= 342.14) (N_A=6.022 x 10^{23})

a) 2.64×10^{22} b) 1.83×10^{22} c) 4.08×10^{21} d) 7.62×10^{21} e) 6.02×10^{23}

6) 10.00 g of phosphorus react with oxygen to produce a compound with a mass of 17.77 g. What is the empirical formula of the compound? (A.M.: P= 30.97, O= 16.00)

a) P_2O_5 b) P_2O_3 c) PO d) PO_2 e) P_2O_7

7) What mass in grams of chromium, Cr, is required to prepare 20.00 g of $K_2Cr_2O_7$? (M.M.: 294.2) (A.M.: K= 39.10, Cr=52.00, O=16.00)

a) 8.72 b) 4.84 c) 7.07 d) 10.6 e) 4.90

$3BaCl_2 + Fe_2(SO_4)_3 \rightarrow 3BaSO_4 + 2FeCl_3$ (1 → 3, 0 → ??)

m.m = 208.23 m = ?? | m.m = 399.91 m = 17.50 | m.m = 233.4

$n = \frac{m}{m.m} = 0.04376$ mole

$Fe_2(SO_4)_3$

8) Barium chloride, $BaCl_2$ (M.M.=208.23) reacts with iron(III) sulfate, $Fe_2(SO_4)_3$ (M.M.=399.91), to produce barium sulfate, $BaSO_4$, (M.M.=233.4) as a precipitate. What minimum mass of barium chloride is required to react completely with 17.50 g of $Fe_2(SO_4)_3$?

a)15.62 g b) 17.6 g c) 10.8 g d) 17.50 g (e) 27.34 g

$n_{BaCl_2} = 0.13128$

$m = 0.13128 * 208.23$

$= 27.34$ g.

9) What is the mass of acetylene, C_2H_2 (M.M.=26.04), that would be produced from the reaction of 2.37 g of calcium carbide, CaC_2 (M.M.=64.1), with excess water?

$CaC_2 + 2\,H_2O \rightarrow C_2H_2 + Ca(OH)_2$

a) 0.0369 g b) 1.247 g c) 0.0370 g (d) 0.963 g e) 0.865 g

$CaC_2 + H_2O \rightarrow C_2H_2$

m = 2.37 g. | m = ??

m.m = 64.1 g/mol | m.m = 26.04

$n = \frac{m}{m.m} = 0.037$ | n = 0.037

$m = 0.037 * 26.04$

$= 0.963$

10) Which of the following is a weak electrolyte in aqueous solution?

a) H_2SO_4 b) HNO_3 (c) H_2S d) NaCl e) $FeCl_3$

K_2SO_4

11) A precipitate is expected when an aqueous solution of potassium sulfate is added to an aqueous solution of

a) Sodium chloride (b) Lead(II) nitrate c) Lithium hydroxide
d) Ammonium nitrate e) Zinc nitrate

12) Which of the following compounds is soluble in water?

(a) $MgSO_4$ b) $CaCO_3$ c) $Cr_3(PO_4)_2$ d) $Al(OH)_3$ e) $BaSO_4$

× × ×

$(5e^- + 8H^+ + MnO_4^- \rightarrow Mn^{+2} + 4H_2O)\times 2$

$(H_2C_2O_4 \rightarrow 2CO_2 + 2H^+ + 2e^-)\times 5$

$2H_2C_2O_4 + 10e^- + 2MnO_4^- + 16H^+ \rightarrow 2Mn^{+2} + 10CO_2$

13) Balance the following reduction-oxidation reaction in acidic medium:

$a\ H_2C_2O_4 + 2\ MnO_4^- \rightarrow 10\ CO_2 + d\ Mn^{2+}$

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

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

$Cl_2 + 2AgNO_3 \rightarrow 2AgCl_{(s)}$

m.m = 143.35

n = 0.0106

14) A 0.9555 g sample of an ionic compound containing chloride ions is dissolved in water and treated with excess $AgNO_{3(aq)}$. If 1.532 g of AgCl precipitates out, What is the percent by mass Cl in the original sample? (A.M.: Ag=107.9, Cl=35.45) 2(35.45) = 70.9

a) 37.11% b) 38.82% c) 39.65% d) 27.96% e) 45.58%

70.9 ×

$\%\ = \frac{\text{عدد ذرات} \times \text{كتلة العنصر}}{\text{كتلة المركب}} \times 100$

$= 3.626 \times 10^{22}$

$= 6.4135 \times 10^{21}$

15) A 0.264 g sample composed of a mixture of NaCl (M.M.=58.44) and $MgCl_2$ (M.M.=95.21) was treated with excess $AgNO_{3(aq)}$. If 0.739g of dry AgCl (M.M.=143.35) forms, what is the mass percent NaCl in the sample?

a) 55.2% b) 62.1% c) 29.8% d) 70.2% e) 37.9%

$NaCl + MgCl_2 + 3AgNO_3 \rightarrow 3AgCl$

0.264

95.21 g/mol

n = 0.0155

m = 1.47

0.739 g.

m.m = 143.35

$m = 5.156 \times 10^{-3}$

18

16) A 0.352 g sample of an organic compound containing H, C and O was burnt in oxygen. The mass of $CO_2(g)$ produced was 0.344 g and the mass of $H_2O(g)$ produced was 0.0704 g. What is the empirical formula of the compound? (A.M.: H=1.00, C=12.00, O=16.00)

a) HCO b) HCO_2 c) H_2CO_2 d) HC_2O e) HC_2O_2

H C O $\rightarrow$ CO_2 + H_2O

0.344 0.0704

m.m = 44 m.m = 18

$n = 7.82 \times 10^{-3}$ $n = 3.91 \times 10^{-3}$

n = 0.00782 = 0.0039

$HCl + Na_2CO_3 \rightarrow$

1 (HCl) → 2 Na

$n = M * V$

M = ??

V

17) What will be the molarity of $HCl_{(aq)}$ solution if 25.4 mL of it is required to titrate a solution made by dissolving 0.425 g Na_2CO_3 (M.M.= 106) in water? $n = M * V$

a) 0.158 b) 0.264 c) 0.316 d) 0.124 e) 0.0401

$n = \frac{m}{m.m} = \frac{0.425}{106}$

$n = 4.009 \times 10^{-3}$

0.078

$\div 2$

$= 2.0047 \times 10^{-3}$

M

18) 0.64 g Na_2S (M.M.=78) is dissolved in water. 1.35 g $Pb(NO_3)_2$ (M.M.=331) is also dissolved in water. The two solutions were mixed to produce PbS (M.M.=239) precipitate. What is the mass of PbS produced?

a) 0.64g b) 0.99g c) 1.35g d) 0.84g e) 0.97g

$Na_2S_{(aq)} + Pb(NO_3)_2 \rightarrow 2NaNO_3 + PbS_{(s)}$

m=0.64 m=1.35 m.m=239

m.m=78 m.m=331 m=??

n=.0082 ~~n=0.004~~ n=.008

$n = 0.0041$

m=

PERIODIC TABLE OF THE ELEMENTS