



King Abdulaziz University

Faculty of Science - Chemistry Department

Chem-110, First Exam

Time: 90 minutes

??? 00/04/1435 H

Name:

Number:

Section:

•Useful information:

Speed of light,

$$c = 3.0 \times 10^8 \text{ m/s}$$

Planck's const.,

$$h = 6.626 \times 10^{-34} \text{ J.s}$$

Avogadro's No.,

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

Rydberg const. for H atom

$$R_H = 2.18 \times 10^{-18} \text{ J}$$

Mass of the electron,

$$m_e = 9.11 \times 10^{-31} \text{ kg}$$

Gas constant,

$$R = 0.082 \text{ L atm K}^{-1} \text{ mol}^{-1}$$

PERIODIC TABLE

Key

Relative atomic mass to nearest whole number

Symbol

Atomic number

PERIODIC TABLE																		4 He Helium 2									
<div>Key</div> <div>12 C Carbon 6</div> <div>Relative atomic mass to nearest whole number</div> <div>Symbol</div> <div>Atomic number</div>																											
7 Li Lithium 3		9 Be Beryllium 4																11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10				
23 Na Sodium 11		24 Mg Magnesium 12																27 Al Aluminum 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18				
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	63.5 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	72.5 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36										
85.5 Rb Rubidium 37	86 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	(96) Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54										
133 Cs Cesium 55	137 Ba Barium 56	139 La Lanthanum 57	178.5 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	(210) Po Polonium 84	(210) At Astatine 85	(222) Rn Radon 86										
(223) Fr Francium 87	(226) Ra Radium 88	(227) Ac Actinium 89	(261) Rf Rutherfordium 104	(262) Db Dubnium 105	(266) Sg Seaborgium 106	(264) Bh Bohrium 107	(265) Hs Hassium 108	(268) Mt Meitnerium 109																			
140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	145 Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162.5 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71														
232 Th Thorium 90	231 Pa Protactinium 91	238 U Uranium 92	237 Np Neptunium 93	244 Pu Plutonium 94	(243) Am Americium 95	(247) Cm Curium 96	(247) Bk Berkelium 97	(251) Cf Californium 98	(252) Es Einsteinium 99	(257) Fm Fermium 100	(258) Md Mendelevium 101	(259) No Nobelium 102	(262) Lr Lawrencium 103														

Choose the correct answer:

(1) Homogeneous mixture is called:

- A. An element B. A compound C. A solution D. An electron

(2) What is the formula mass of $(\text{NH}_4)_2\text{CrO}_4$?

- A. 152 g/mol B. 78 g/mol C. 134 g/mol D. 102 g/mol

(3) In the periodic table the horizontal rows contain elements which

- A. Belong to the same family
B. Exhibit similar chemical reactions.
C. Belong to the same period
D. Are represented by same number of example

(4) If the solubility of a salt is 36.0 g /100 g-water, what is the minimum of water that would dissolve 51.0 g of salt?

- A. 72 g B. 142 g C. 180 g D. 360 g

(5) The two major types of pure substances are

- A. Compounds & Solutions C. Compounds & Elements
B. Elements & Mixtures D. Solutions & Elements

(6) A balloon with a volume of 8.73 L contains 0.321 moles of helium gas. What is the density of the gas?

- A. 0.0368 g/L B. 0.147 g/L C. 0.700 g/L D. 2.80 g/L

(7) Use the following table and choose which of the species are positively charged?

Atom or ion of element	I	II	III	IV	V	VI
Atom or ion of element (e)	6	10	18	10	28	7
Atom or ion of element (p)	6	8	17	11	30	7
Atom or ion of element (n)	6	8	18	11	36	6

- A. III and V B. II and III C. IV and V D. I and VI

(8) The correct value and units for the problem

$$\frac{0.0999 \text{ mol/L NaOH} \times 5 \text{ L} \times (23+1+16) \text{ g}}{1 \text{ mol NaOH}} \div \frac{1.2042 \times 10^{24} \text{ NaOH Molecules}}{6.022 \times 10^{23} \text{ NaOH Molecules}} =$$

- A. 40 g B. 10 g C. 40 L D. 10 L

(9) The SI Base Unit for length is:

- A. meter B. kilometer C. mile D. foot

(10) The product of the reaction between Al and O_2 is predicted to be

- A. AlO B. AlO₂ C. Al₂O₃ D. AlO₄

(11) Which is the largest mass?

- A. 0.5 kg B. 0.5 g C. 50 g D. 500 mg

(12) Which of the following SI prefixes express the 1×10^{-3} meter:

- A. kilo B. deci C. centi D. milli

(13) Express 7500 mm as picometer:

- A. 7.5 pm B. 7.5×10^6 pm C. 7.5 pm D. 7.5×10^{12} pm

(14) The mole ratio of NaOH to I_2 is found to be: (for the following equation)



- A. 2/1 B. 6/5 C. 5/1 D. 1/3

(15) The following set of data for a compound illustrates best which law?

Mg	Cl	Mg/Cl
24.0g	71.0g	0.338
12.0g	35.5g	0.338
A. multiple proportions		B. Definite composition
C. conservation of mass		D. Dulong and Petit

(16) The sulfide ion, S^{2-} has (p = protons and e = electrons)

- A. 16 p and 18 e C. 16 p and 16 e
B. 16 p and 14 e D. 16 p and 10 e

(17) Given the formulas $MgBr_2$ and $AlCl_3$, which other formulas would NOT be predicted:

- A. $MgCl_2$ B. MgF_3 C. $AlBr_3$ D. AlI_3

(18) The compound silicon tetrafluoride would have the formula

- A. SiF B. SiF_4 C. Si_4F D. S_2F

(19) How many grams of Na_3PO_4 are required to make one mole?

- A. 164g B. 118g C. 82g D. 70g

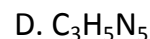
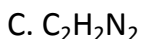
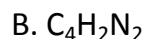
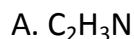
(20) A family which easily forms anions is

- A. alkali metals (Group 1) C. halogen (Group 7)
B. noble gases D. transition metals

(21) How many sodium atoms are there in 3.0 g of Na_2CO_3 ?

- A. 3.41×10^{22} atom C. 3.41×10^{25} atom
B. 4.71×10^{21} atom D. 5.41×10^{22} atom

(22) A 5.27g sample of a compound containing the elements Carbon, nitrogen and hydrogen is converted to 6.26 g CO₂ and 3.32 g nitrogen. What is its empirical formula?



(23) The most common isotope of radium is ²²⁶Ra which contains

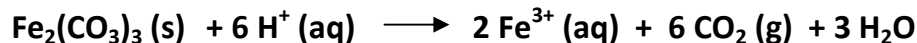
A. 88 protons and 226 neutrons.

B. 138 protons and 88 neutrons.

C. 226 protons and 314 neutrons.

D. 88 protons and 138 neutrons.

(24) According to the following equation, if 6 mol of Fe₂(CO₃)₃ are mixed with 10 mol of H⁺



A. all of the Fe₂(CO₃)₃ will react.

B. all of the H⁺ will react.

C. 3.3 mol of Fe₂(CO₃)₃ will react.

D. 1.6 mol of H⁺ will remain unreacted.

(25) A 10.0 mL of 0.665 M KMnO₄ solution is mixed with 16.7 mL of 0.892M KMnO₄ solution. Calculate the concentration of the final solution.

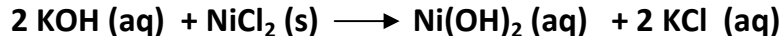
A. 0.778 M

B. 0.807 M

C. 2.37 M

D. 0.411 M

(26) Determine the volume of 0.1 M KOH required to react exactly with 0.02 mol of NiCl₂ to form a precipitate of Ni(OH)₂.



A. 400 mL

B. 200 mL

C. 40 mL

D. 20 mL

(27) How many moles of Cl¹⁻ are in 20.0 mL of 0.40 M MgCl₂?

A. 0.0080

B. 0.76

C. 0.016

D. 1900

(28) How many milliliters of water must be added to 267 mL of 0.15 M Na₂CO₃ to prepare 0.05 M Na₂CO₃?

(A) 536.0 ml

(B) 534.0 ml

(C) 530.0 ml

(D) 537.0 ml

(29) In the following equation, if 62 g CaCO₃ are decomposed and 259 g CaO are collected, how many grams of CO₂ are generated?



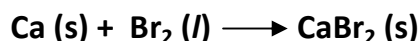
A. 44 g

B. 100 g

C. 203 g

D. 667 g

(30) The following reaction begins with 40.0 g Ca and an excess Br₂. The yield is 50%. How many grams of CaBr₂ are produced?



A. 20 g

B. 100 g

C. 200 g

D. 60 g

المصطلح الانجليزي		المصطلح الانجليزي	
Begin	يبدأ	Homogeneous	
Calculate		horizontal	
Collected	تجميع	illustrates	
common isotope	نظير عام	largest	
concentration	تركيز	length	
containing	يتكون	mixed	
correct value	قيمة صحيحة	periodic table	
decompose	يتكسر	positively charged	
density		Predict	يتنبأ
Determine	تقدير	prepare	تحضير
empirical formula	صيغة أولية (بسيطة)	Produce	ينتد
Equation		react	يتفاعل
exactly		remain	ي
Express	يعبر	required	يتطلب
final	نهائي	solubility of a salt	ذوبانية الملح
forms	يتكون	Solution	
Formula	صيغة	species	جسيمات
Gas		types of pure substances	أنواع المواد النقية
Generated	ينتج	volume	
		yield	