

**A**

## King Abdulaziz University

Faculty of Science - Chemistry Department

Thursday 19 /05 /1435 H

Chem-110, First Exam

Time: 90 minutes

Name:	Number:	Section:
<b>•Useful information:</b>		
Speed of light, Planck's const., Avogadro's No., Rydberg const. for H atom Mass of the electron, Gas constant,	$C = 3.0 \times 10^8 \text{ m/s}$ $h = 6.626 \times 10^{-34} \text{ J.s}$ $N_{av} = 6.022 \times 10^{23} \text{ mol}^{-1}$ $R_H = 2.18 \times 10^{-18} \text{ J}$ $m_e = 9.11 \times 10^{-31} \text{ kg}$ $R = 0.082 \text{ L atm K}^{-1} \text{ mol}^{-1}$	

1 H Hydrogen 1	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
7 Li Lithium 3	12 C Carbon 6	13 Al Aluminum 13	14 Si Silicon 14	15 P Phosphorus 15	16 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
23 Na Sodium 11	24 Mg Magnesium 12	27 Al Aluminum 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	79 Br Bromine 35	80 Kr Krypton 36
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
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
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
(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
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
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	(251) Bk Berkelium 97
						(252) Cf Californium 98	(252) Es Einsteinium 99
						(257) Fm Fermium 100	(257) Md Mendelevium 101
						(259) No Nobelium 102	(262) Lr Lawrencium 103

4:35 = 4:40

5 min

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## Choose the correct answer

A-1 Which of the following is not a mixture?

- a) Oxygen      b) Pizza      c) Sugar solution      d) Air

A-2 What is the SI unit for length?

- a) Centimeter      b) Inch      c) Meter      d) Kilometer

A-3 How many decimeters are there in 15 centimeters?

- a) 150 dm      b) 1.5 dm      c) 0.15 dm      d) 15 dm

A-4 What is the symbol of the element that has 24 neutrons and a mass number of 45?

- a) Sc      b) Tm      c) Cr      d) Rh

A-5 How many electrons are in  $\text{^{48}_{22}Ti}^{4+}$ ?

- a) 18      b) 22      c) 26      d) 70

A-6 Which of the following elements is a metal?

- a) Co      b) Ar      c) I      d) C

A-7 Which two of the following pair of atoms are isotopes?

- a)  $\text{^{39}_{19}K}$  and  $\text{^{39}_{18}Ar}$       b)  $\text{^{40}_{20}Ca}$  and  $\text{^{40}_{21}Sc}$       c)  $\text{^{40}_{20}Ca}$  and  $\text{^{43}_{20}Ca}$       d)  $\text{^{39}_{19}K}$  and  $\text{^{23}_{11}Na}$

A-8 Which three elements have similar chemical properties?

- a) N, O, Ne      b) Na, Mg, Al      c) Ca, Sr, Ba      d) Ni, Cu, Zn

A-9 Which of the following could be an empirical formula?

- a)  $\text{C}_6\text{H}_6$       b)  $\text{C}_5\text{H}_{10}$       c)  $\text{C}_4\text{H}_{10}$       d)  $\text{C}_2\text{H}_5$

A-10 An example of monatomic ion is

- a)  $\text{NO}_3^{-1}$       b)  $\text{O}^{-2}$       c)  $\text{O}_2$       d)  $\text{SO}_4^{-2}$

A-11 How many moles are in 3 g of carbon?

- a) 0.5 mole      b) 4 mole      c) 0.25 mole      d) 2 mole

A-12 How many atoms are there in 5.4 g of sodium?

- a)  $6.023 \times 10^{23}$  atoms      b)  $3.011 \times 10^{23}$  atoms      c)  $1.41 \times 10^{23}$  atoms      d)  $1.501 \times 10^{23}$  atoms

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$$53.94x - 0.0594 + 55.93x - 0.9175$$

A-13 Calculate the average atomic mass of iron which consists of three stable isotopes: iron-54 (5.99%), iron-56 (91.75%) and iron-57 (2.26%) which has atomic masses of 53.94 amu, 55.93 amu and 56.94 respectively.

- a) 57.1 amu      b) 54.47 amu      c) 52.52 amu      d) 55.83 amu

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A-14 What is the percent composition of phosphorus in  $\text{Ca}_3(\text{PO}_4)_2$ ?

- a) 20%      b) 11%      c) 22%      d) 36%

A-15 A compound is composed of 40.92% carbon, 4.58% hydrogen and 54.5% oxygen by mass.

Determine the empirical formula of this compound?

- a)  $\text{CHO}$       b)  $\text{C}_2\text{H}_3\text{O}_2$       c)  $\text{C}_3\text{H}_4\text{O}_3$       d)  $\text{C}_3\text{HO}_3$

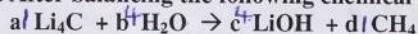
A-16 The molar mass of the compound above found to be 176 g/mole. What is its molecular formula?

- a)  $\text{C}_6\text{H}_6\text{O}_6$       b)  $\text{C}_6\text{H}_9\text{O}_6$       c)  $\text{C}_7\text{H}_{12}\text{O}_5$       d)  $\text{C}_6\text{H}_8\text{O}_6$

A-17 The process in which one or more substances are changed into one or more new substances is called:

- a) dilution      b) mole      c) Chemical symbols      d) Chemical reaction

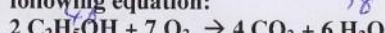
A-18 After balancing the following chemical equation:



The sum of a, b, c and d (a+b+c+d) is:

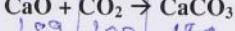
- a) 10      b) 6      c) 8      d) 5

A-19 How many grams of water is produced by burning 23 g of  $\text{C}_2\text{H}_5\text{OH}$  according to the following equation:



- a) 9 g      b) 27 g      c) 18 g      d) 21.5 g

A-20 The reaction of 10 g CaO with 10 g of  $\text{CO}_2$  produced  $\text{CaCO}_3$  according to the following equation:



The limiting reagent is:

- a) CaO      b)  $\text{CO}_2$       c) CaO and  $\text{CO}_2$       d)  $\text{CaCO}_3$

A-21 What is the excess reagent in the previous question (question 20)?

- a) CaO      b)  $\text{CO}_2$       c) CaO and  $\text{CO}_2$       d)  $\text{CaCO}_3$

A-22 What is the percent yield of  $\text{CaCO}_3$  in question (20) if 15 g of  $\text{CaCO}_3$  are actually obtained?

- a) 100%      b) 66%      c) 84%      d) 150%

*58.5*  
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**A-23** What mass of NaCl is needed to prepare 1 L of 0.5 M sodium ion solution?  
a) 11.5 g      b) 29.25 g      c) 55.5 g      d) 32.3 g

**A-24** What volume of 0.5M NaOH solution would you need to prepare 100 mL of 0.1 M NaOH solution?  
a) 200 mL      b) 0.20 mL      c) 20 mL      d) 2 mL

**A-25** 1 L of a 0.5 M NaCl solution is mixed with 0.5 L of 0.1 M NaCl. What is the concentration of NaCl in the final solution?  
a) 0.367 M      b) 0.6 M      c) 0.55 M      d) 0.4 M

**A-26** Calculate the density of platinum metal with a mass of 96.5g and a volume of 4.49 cm<sup>3</sup>?  
a) 21.5 g/mL      b) 2.15 g/mL      c) 0.05 g/mL      d) 215 g/mL

**A-27** What is the chemical name of the formula SO<sub>2</sub>?  
a) Sulfur dioxide      b) Sulfur trioxide      c) Sulfur oxide      d) Sulfate

**A-28** What is the correct formula of sodium nitrate?  
a) NaNO<sub>3</sub>      b) NaNO<sub>2</sub>      c) NaN      d) NaNO<sub>4</sub>

**A-29** The correct formula of a compound consists of F and Mg is  
a) Mg<sub>2</sub>F<sub>3</sub>      b) Mg<sub>2</sub>F      c) MgF<sub>2</sub>      d) MgF

**A-30** Which of the following is most likely to be poor conductors of heat and electricity?  
a) F      b) Mg      c) Na      d) Fe