Menofia University Faculty of Electronic Engineering Dept of Phy and Math Engineering	Engineering Chemistry Final Exam 22-1-2020	Marks=90 marks Code: 007 فر Time: 3 hr

تعليمات الامتحان

أجابه الأسئلة الخاصة بالدكتور محمود محفوظ تبدأ من الجانب الأيمن لكراسة الإجابة

أجابه الأسئلة الخاصة بالدكتور / خالد محمود تبدأ من الجانب الأيسر لكراسة الإجابة

تبدأ إجابة كل سؤال في صفحة جديدة مع كتابة رقم السؤال واضحا اعلي الصفحة

يراعي أن تكون الإجابات منظمة ومرتبة حسب ترتيب أرقام الأسئلة وبخط واضح مستخدما القلم الجاف

لن تصحح الإجابات المكتوبة باللغة العربية أو القلم الرصاص أو الأقلام الملونة

First question *(22 Marks)*

Choose the best correct answer: *(11 marks)*

أكتب رقم السؤال فقط وإمامة الحرف a او b اوc ..... الدال علي الإجابة الصحيحة

1-The bond formed between ammonia NH_3 and hydrogen ion (H^+) to give ammonium ion (NH_4^+) is ..... bond

(a) Ionic (b) Covalent (c) Coordinate (d) Hydrogen

2- Arrange the following substances in terms of *DECREASING* boiling points:

N_2, O_2, NO

(a) $N_2 > O_2 > NO$ (b) $NO > N_2 > O_2$ (c)) $NO > O_2 > N_2$ (d) $N_2 > NO > O_2$

3-The bond between hydrogen and oxygen atoms within a water molecule (H_2O) is called:

(a) Hydrogen bond. (b) Pure covalent bond (c) polar covalent bond (d) Both a and b

4- What is the intermolecular force in $MgCl_2$ (aqueous) محلول مائي?

(a) Ion–ion (b) Dipole–dipole (c) Ion–dipole (d) Hydrogen bonding.

5-Which of the following are classified as intermolecular forces?

(a) Covalent bonding and ion-dipole interactions (b) Ionic bonding and covalent bonding

(c) Hydrogen bonding and ion-dipole interaction (d) Ionic bonding and hydrogen bonding

6- Thallium-208 has a half-life of 3.053 min. How long will it take for 120 g to decay to 7.50 g?

(a) 9.16 min (b) 12.21 min (c) 6.11 min (d) 21.12 min

7- When a ß (beta) particle is emitted ينبعث from the nucleus a .....

(a) neutron is emitted (b) proton changes into a neutron

(c) neutron changes into a proton (d) proton is emitted

8- Which of the following are the correct values of (n) and (l) for (4f) sublevel?

(a) $n = 4,\ l = 0$ (b) $n = 4,\ l = 3$ (c) $n = 3,\ l = 3$ (d) $n = 3,\ l = 1$

9- The four quantum numbers for the electron in a hydrogen atom ($_1H$) are:

(a) $n = 2,\ l = 1,\ m_l = 1,\ m_s = 0$ (b) $n = 1,\ l = 0,\ m_l = 0,\ m_s = +1/2$

(c) $n = 1,\ l = 2,\ m_l = -2,\ m_s = -1/2$ (d) $n = 1,\ l = 1,\ m_l = -2,\ m_s = +1/2$

10-If P, V, M, T, and R are the pressure, volume, molar mass, temperature and universal gas constant respectively, then the density of an ideal gas is given by:

(a) RT/PM (b) PM/RT (d) M/V (c) P/RT

11- What must remain constant for the equation of state P1 x V1 / T1 = P2 x V2 / T2 to be true?

(a) Volume (b) Number of Moles (c) Pressure (d) Temperature

(B) Write down (√) or (x) for the following statements. *(11 Marks)*

اكتب رقم السؤال ثم ضع امامه علامه صح او غلط فقط

1- $^{232}_{90}Th$ is converted into $^{208}_{82}Pb$ through the emissions of a series of α and β^- particle, the number of α particles emitted in this nuclear decay = 8.

2- 1 gram of any gas at S.T.P. (0^oC, 1 atmo) occupies a volume of 22.4 Liter.

3- The following nuclear reaction $^{12}_{6}C + ^{207}_{82}Pb \longrightarrow ^{218}_{87}Fr + ^{1}_{1}H$ represents Nuclear fission.

4-The covalent bond is formed when hydrogen atom is located between two atoms having higher electronegativity like F, O and N.

5- The correct electronic configuration for $_{35}Br$ is : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^5$.

6- At constant pressure, the volume of a given quantity of a gas is increased or decreased by 1/273 of its volume at 0^oC for every one degree centigrade rise or fall of temperature.

7- The 3 rd energy level of an atom will contain 3-sublevels, 9 orbitals and 18 electrons.

8-Relative strength of *intermolecular forces* is arranged as follows:
Ion-Dipole > Hydrogen-bond> Dipole-Dipole> London Dispersion

9- Building up principle concerning the distribution of electrons in levels (shells), whereas, Hund's rule concerning the distribution of electrons in orbitals.

10- The ionic bond is formed between two elements, the difference in electronegativity between them is more than 1.7.

11- The source of energy produced by the sun is the fusion of hydrogen isotopes.

Second question *(23 Marks)*

(A) Write the scientific terms for the following: اكتب المصطلح العلمي للعبارت الاتيه (6 Marks)

1- It defines the number of orbitals in a certain energy sublevel and their orientation in space.

2- The total pressure of a mixture of gases [that does not react chemically with each other] is equal to the sum of the partial pressure of the individual gases.

3- The addition of an electron to a proton in the nucleus led to the transformation of proton into neutron in a radioactive decay.

(B) Write equations for the following nuclear decay reactions. *Make sure that both mass numbers and atomic numbers are balanced on each side.* (4 Marks)

(1) $^{76}_{36}Kr$ Undergoes electron capture

(2) The alpha decay of $^{198}_{86}Rn$

(C) Determine the location of the following elements at the periodic table of elements:

$_{11}Na$, $_{17}Cl$ (4 Marks)

(D) Predict the order of *increasing* boiling points for the following compounds:

H_2S; H_2O; CH_4; H_2; NaCl. **(2 Marks)**

(E) Identify حدد the type of intermolecular force in the following compounds: **(2 Marks)**

(1) Between H_2O molecules.

(2) Between HCl (gas) molecules.

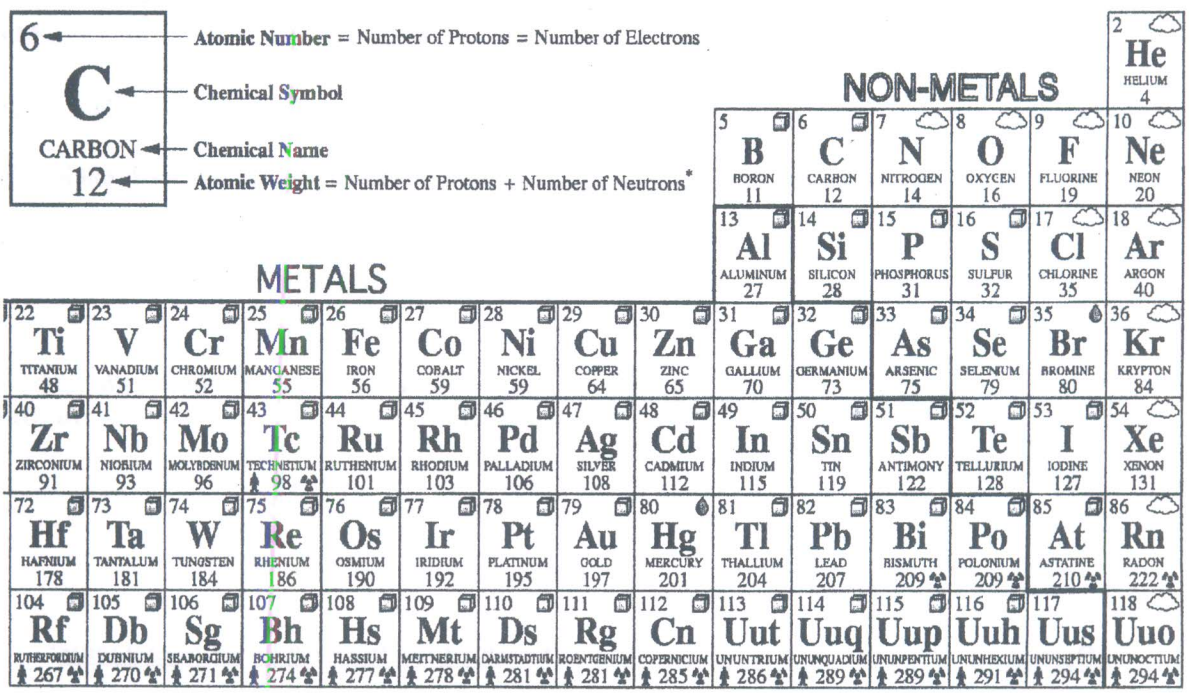
(F) Solve the following problems :

1- Determine the volume of a gas at S.T.P (standard conditions) (zero ^oC, 1 atmo.), if this volume equals to 20 L at 127 C and under pressure of 2 atm. **(2 Marks)**
R = 0.0821 L· atm/mol· K

2- Compute relative rates of effusion of H_2, CO_2 through an orifice (ثقب) . **(2 Marks)**

(G) Answer the following question :

1- What is the maximum number of electrons that can occupy each of the following subshells:
(a) 3p **(b) 4d** **(1 Mark)**



GOOD LUCK