



C

King Abdul Aziz University
Faculty of science
Chemistry department

Model (C)

Chem.110

Second exam of 1st term 1432-1433H

Time: 90 minutes

Student name:	
Student number	
Section	

Useful information

Speed of light, $c = 3.0 \times 10^8$ m/s

Planck's const., $h = 6.626 \times 10^{-34}$ J.s

Avogadro's No., $N_{av} = 6.022 \times 10^{23}$ mol⁻¹

Rydberg const. for H atom $R_H = 2.179 \times 10^{-18}$ J

Gas constant $R = 0.082$ L atm K⁻¹ mol⁻¹ = 8.314 JK⁻¹mol⁻¹

1 atm = 760 mmHg = 1.01325×10^5 Pa

With the best wishes

General Chemistry Team work

Directions: For each of the following questions, choose the letter that **best** answers the question and place it on your answer sheet.

1. Which of the following exist as diatomic gas

- a) He
- b) Ar
- c) Xe
- d) N**

2. Which of the following pressure values is the largest?

- a) 1181 torr**
- b) 595 mmHg
- c) 1.00 atm
- d) 167 Pa

3. Under constant-pressure conditions a sample of hydrogen gas at 104.0°C and 5.0 L is cooled to a final volume 2.5 L. What is its final temperature?

- a) 1.88×10^2 K**
- b) 4.88×10^2 K
- c) 2.88×10^2 K
- d) 5.88×10^2 K

4. A sample of oxygen occupies 1232.0 liters under a pressure of 5.93 mmHg at 25°C.

What volume would it occupy at 25°C if the pressure were changed to 1.7 atm?

- a) 8.655 L
- b) 5.655 L**
- c) 1.655 L
- d) 7.655 L

5. The volume of a sample of nitrogen is 10.7 liters at 35°C and 0.970 atm. What volume will it occupy at STP?

- a) 5.2 L
- b) 9.2 L**
- c) 12.2 L
- d) 10.2 L

6. What is the density of Neon (Ne) gas at STP?

- a) 0.893 g L^{-1}**
- b) 4.893 g L^{-1}
- c) 1.893 g L^{-1}
- d) 2.893 g L^{-1}

7. A mixture of gases contains 12 g of H_2 and 10 g of He. Calculate the partial pressure of the He gas if the total pressure is 4.25 atm.

- a) 0.788 atm
- b) 3.788 atm
- c) 4.788 atm
- d) **1.256 atm**

8. Calculate the volume of PH_3 at $20^\circ C$ and 865.0 mmHg that can be prepared by addition of a water to 1.48 g of Ca_3P_2 . $Ca_3P_{2(s)} + 6H_2O_{(l)} = 3Ca(OH)_{2(s)} + 2PH_{3(g)}$

- a) **343.32 ml**
- b) 340.32 ml
- c) 347.32 ml
- d) 345.32ml

9. What is the wavelength (λ) of radiation that has a frequency of 65.1×10^{15} Hz?

- a) **0.046×10^{-5} cm**
- b) 0.46×10^{-4} cm
- c) -0.46×10^{-4} cm
- d) -0.46×10^{-5} cm

10. What is the frequency of radiation having a wavelength of 461.0 nm?

- a) **6.51×10^{14} Hz**
- b) 6.81×10^{12} Hz
- c) 6.81×10^{14} Hz
- d) 6.51×10^{12} Hz

11. What is the energy of ultraviolet light, if the wavelength of this radiation is 45.5 nm?

- a) 0.64×10^{-17} J
- b) 0.44×10^{-17} J
- c) 0.44×10^{-18} J
- d) **4.36×10^{-18} J**

12. In what group would an element of atomic number 37 be placed?

- a) group 5A
- b) **group 1A**
- c) group 2A
- d) group 3A

13. Which of the following elements is a d-block element?

- a) **Fe**
- b) Na
- c) Br
- d) N

14. Which of the following elements has the largest radius?

- a) Br
- b) F
- c) I**
- d) Cl

15. Which of the following has the smallest radius?

- a) S^{2-}
- b) Cl^-
- c) Ar
- d) K^+**

16. A possible set of quantum numbers for the last electron added to complete an atom of palladium (Pd) in its ground state is

- a) $n = 2, \ell = 2, m_l = 0, m_s = +\frac{1}{2}$
- b) $n = 3, \ell = 0, m_l = 0, m_s = -\frac{1}{2}$
- c) $n = 3, \ell = 1, m_l = -1, m_s = -\frac{1}{2}$
- d) $n = 4, \ell = 2, m_l = 0, m_s = +\frac{1}{2}$**

17. The number of valence electrons in carbon atom (C) is _____.

- a) 3
- b) 6
- c) 4**
- d) 5

18. Which of the following elements has the highest electron affinity?

- a) O**
- b) B
- c) C
- d) Li

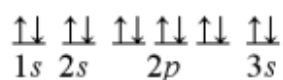
19. Which of the following elements has the lowest first ionization energy?

- a) As
- b) Ga**
- c) Br
- d) Ca

20. Rank the following elements in order of decreasing atomic size: F, P, Mg, Cs

- a) $Cs > Mg > F > P$
- b) $F > P > Mg > Cs$
- c) $Cs > F > Mg > P$
- d) $Cs > Mg > P > F$**

21. The following orbital diagram corresponds to the element _____.



- a) P
- b) Mg**
- c) Br
- d) Cl

22. Which of these elements has the *lowest* electronegativity?

- a) N
- b) F
- c) O
- d) I**

23. The element that has the electron configuration $[\text{Ne}] 3s^2 3p^2$ is:

- a) Al
- b) Si**
- c) P
- d) Cl

24. What is the total number of orbital's associated with the $n = 3$ level?

- a) 9**
- b) 6
- c) 3
- d) 5

25. Which of the following electronic configurations represents a paramagnetic atom?

- | | 1s | 2s | 2p |
|-----------|----------------------|----------------------|--|
| a) | $\uparrow\downarrow$ | $\uparrow\downarrow$ | $\uparrow\downarrow \uparrow\downarrow \uparrow\downarrow$ |
| b) | $\uparrow\downarrow$ | $\uparrow\downarrow$ | $\uparrow\downarrow \uparrow\downarrow \uparrow\downarrow$ |
| c) | $\uparrow\downarrow$ | $\uparrow\downarrow$ | — — — |
| d) | $\uparrow\downarrow$ | — | — — — |

26. How many unpaired electrons are in the ground state electron configuration of a nitrogen atom?

- a) 1
- b) 2
- c) 3**
- d) 5

27. Which of the following is *isoelectronic* with Ar

- a) **Ca²⁺**
- b) Li⁺
- c) Na⁺
- d) Ne

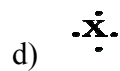
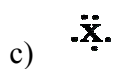
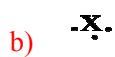
28. Which of the following is the electron configuration for a scandium atom, Sc?

- a) [Ar] 3d²
- b) **[Ar] 4s² 3d¹**
- c) [Ar] 4d²
- d) [Ar] 4s² 4d²

29. The electron configuration of Copper (ii) ion (Cu⁺²) is

- a) **[Ar] 3d⁹**
- b) [Ar] 4s²3d¹⁰
- c) [Ar] 4s²3d⁹
- d) [Ar] 4s¹3d¹⁰

30. What is the Lewis dot structure of element with atomic number 5 (z=5)



hydrogen 1 H 1.0079																						helium 2 He 4.0026	
lithium 3 Li 6.941	beryllium 4 Be 9.0122											boron 5 B 10.811	carbon 6 C 12.011	nitrogen 7 N 14.007	oxygen 8 O 15.999	fluorine 9 F 18.998	neon 10 Ne 20.180						
sodium 11 Na 22.990	magnesium 12 Mg 24.305											aluminium 13 Al 26.982	silicon 14 Si 28.086	phosphorus 15 P 30.974	sulfur 16 S 32.065	chlorine 17 Cl 35.453	argon 18 Ar 39.948						
potassium 19 K 39.098	calcium 20 Ca 40.078		scandium 21 Sc 44.956	titanium 22 Ti 47.867	vanadium 23 V 50.942	chromium 24 Cr 51.996	manganese 25 Mn 54.938	iron 26 Fe 55.845	cobalt 27 Co 58.933	nickel 28 Ni 58.693	copper 29 Cu 63.546	zinc 30 Zn 65.39	gallium 31 Ga 69.723	germanium 32 Ge 72.61	arsenic 33 As 74.922	selenium 34 Se 78.96	bromine 35 Br 79.904	krypton 36 Kr 83.80					
rubidium 37 Rb 85.468	strontium 38 Sr 87.62		yttrium 39 Y 88.906	zirconium 40 Zr 91.224	niobium 41 Nb 92.906	molybdenum 42 Mo 95.94	technetium 43 Tc [98]	ruthenium 44 Ru 101.07	rhodium 45 Rh 102.91	palladium 46 Pd 106.42	silver 47 Ag 107.87	cadmium 48 Cd 112.41	indium 49 In 114.82	tin 50 Sn 118.71	antimony 51 Sb 121.76	tellurium 52 Te 127.60	iodine 53 I 126.90	xenon 54 Xe 131.29					
caesium 55 Cs 132.91	barium 56 Ba 137.33	57-70 *	lutetium 71 Lu 174.97	hafnium 72 Hf 178.49	tantalum 73 Ta 180.95	tungsten 74 W 183.84	rhenium 75 Re 186.21	osmium 76 Os 190.23	iridium 77 Ir 192.22	platinum 78 Pt 195.08	gold 79 Au 196.97	mercury 80 Hg 200.59	thallium 81 Tl 204.38	lead 82 Pb 207.2	bismuth 83 Bi 208.98	polonium 84 Po [209]	astatine 85 At [210]	radon 86 Rn [222]					
francium 87 Fr [223]	radium 88 Ra [226]	89-102 * *	lawrencium 103 Lr [262]	rutherfordium 104 Rf [261]	dubnium 105 Db [262]	seaborgium 106 Sg [266]	bohrium 107 Bh [264]	hassium 108 Hs [269]	meitnerium 109 Mt [268]	ununnilium 110 Uun [271]	unununium 111 Uuu [272]	ununbium 112 Uub [277]		ununquadium 114 Uuq [289]									

* Lanthanide series

lanthanum 57 La 138.91	cerium 58 Ce 140.12	praseodymium 59 Pr 140.91	neodymium 60 Nd 144.24	promethium 61 Pm [145]	samarium 62 Sm 150.36	europium 63 Eu 151.96	gadolinium 64 Gd 157.25	terbium 65 Tb 158.93	dysprosium 66 Dy 162.50	holmium 67 Ho 164.93	erbium 68 Er 167.26	thulium 69 Tm 168.93	ytterbium 70 Yb 173.04
actinium 89 Ac [227]	thorium 90 Th 232.04	protactinium 91 Pa 231.04	uranium 92 U 238.03	neptunium 93 Np [237]	plutonium 94 Pu [244]	americium 95 Am [243]	curium 96 Cm [247]	berkelium 97 Bk [247]	californium 98 Cf [251]	einsteinium 99 Es [252]	fermium 100 Fm [257]	mendelevium 101 Md [258]	nobelium 102 No [259]

* * Actinide series