A

King Abdul Aziz University
Faculty of science
Chemistry department

Model (A)

Chem.110
Final exam of 1st term 1432-1433H
Time: 120minutes

Student name:	
Student number	
Section	

Useful information

Speed of light,	$c = 3.0\times10^{8}$ ***m/s***
Planck's const.,	$h = 6.63\times10^{-34}$ ***J.s***
Avogadro's No.,	$N_A = 6.022\times10^{23}$ mol^{-1}
Rydberg const. for H atom,	$R_H = 2.18\times10\text{-}18$ ***J***
Gas constant,	$R = 0.082$ ***L atm*** K^{-1} mol^{-1}

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.The diameter of a circuit is 59 X 10^5 cm. What is this diameter when expressed in micrometers?

a) 59×10^{11}µm
b) 59×10^5µm
c) 59×10^9µm
d) 59×10^7µm

3.How many milliliters in 1.4381 L?

a) 1438.1 mL
b) 14.38 mL
c) 143.81 mL
d) 14381.0 mL

3. Bromine is a red liquid at 25° C. Its density is 3.12 g/cm^3. What is the volume of 46.5 g of liquid bromine?

a) 12.9 cm^3
b) 14.9 cm^3
c) 15.9 cm^3
d) 17.9 cm^3

4. Which of the following is a SI base unit?

a) gram
b) hour
c) meter
d) all of the above

5. Which of the following element is in the halogen group?

a) I
b) O
c) B
d) S

6. Which pair of Atomics would be most likely to form an ionic compound?

a) K and Cu
b) Na and Zn
c) K and Cl
d) Cs and Ca

7. Give the number of protons (p), electrons (e), and neutrons (n) in $^{16}_{8}O^{2-}$.

a) 8 p, 10 n, 8 e
b) 8 p, 10 n, 8 e
c) 8 p, 8 n, 10 e
d) 10 p, 8 n, 8 e

8. What is the mass of 0.39 mol nickel (Ni) metal?

a) 23.01 g
b) 24.01 g
c) 24.51 g
d) 25.51 g

9. How many grams of Cl_2 can be prepared from the reaction of 18.4 g of MnO_2 with excess HCl according to the chemical equation?

$$MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$$

a) 12.02 g
b) 11.02 g
c) 16.02 g
d) 15.02 g

10.Calculate the molarity of a solution of 6 g of ethanol (C_2H_5OH) in 508 mL of solution.

a) 1.24 M
b) 0.3 M
c) 0.26 M
d) 2.24 M

11. How many bonds around carbon atom in, CO_3^{2-}?

a) 1
b) 4
c) 2
d) 5

12. The formal charge on phosphorous atom in, PI_3?

a) + 2
b) +4
c) +5
d) **0**

13. The type of bond in $CaCl_2$ Compound can be classified as

a) Polar covalent bond
b) Ionic bond
c) Hydrogen bond
d) nonpolar Covalent bond

14. How many total valence electrons are present in, H_3PO_3?

a) 12
b) 32
c) 26
d) 30

15. The electron configuration $1s^2 2s^2 2p^6$ applies to all of the following species except:

a) Ca^{2+}
b) Na^+
c) Ne
d) F^-

16. The correctly drawn Lewis formula for CBr4 will have _____.

a) 4 single bonds and 24 nonbonding electrons
b) 4 single bonds and 20 nonbonding electrons
c) 4 single bonds and 18 nonbonding electrons
d) 4 single bonds and 16 nonbonding electrons

17. Which one of the following molecules would exhibit resonance?

a) O_2
b) H_2S
c) CH_4
d) SO_2

18. Which of these molecules has an expanded of the octet rule?

a) NF_3
b) PH_3
c) Br_2
d) SF_6

19. If the initial pressure of a 2.00 L gas sample is 2.50 atm, what will the pressure be if the volume is changed to 6.00 L at constant temperature?

a) 0.600 atm
b) 1.50 atm
c) 0.833 atm
d) 3.75 atm

20 .Propane burns in air according to the equation: $C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(g)$ What volume of CO_2 would be formed if 4.00 L of propane burns, assuming that all of the gases are under the same conditions?

a) 12.0 L
b) 24.0 L
c) 3.00 L
d) 4.80 L

21. Select the correct equilibrium constant expression for the reaction:

$$CH_4(g) + 2O_2(g) \rightleftarrows CO_2(g) + 2H_2O(g)$$

a) $K_{eq} = [CH_4][O_2]^2 / [CO_2][H_2O]^2$
b) $K_{eq} = [CH_4][O_2] / [CO_2][H_2O]$
c) $K_{eq} = [CO_2][H_2O] / [CH_4][O_2]$
d) $K_{eq} = [CO_2][H_2O]^2 / [CH_4][O_2]^2$

22. Select the solution below that is the most basic.

a) $[H^+] = 1.0 \times 10^{-10}$ M
b) $[H^+] = 1.0 \times 10^{-6}$ M
c) $[H^+] = 1.0 \times 10^{-8}$ M
d) $[H^+] = 1.0 \times 10^{-4}$ M

23. Consider the following system at equilibrium:

$$CH_4(g) + 2H_2O(g) \rightleftarrows CO_2(g) + 4H_2(g)$$

What change will cause the equilibrium to shift to form more CO_2?

a) add a catalyst
b) decrease $[H_2O]$
c) decrease the volume of the reaction vessel
d) decrease $[H_2]$

24. Consider the following system at equilibrium:

$$C_2H_2(g) + H_2(g) \rightleftarrows C_2H_6(g) \qquad \text{Exothermic}$$

What change will be observed if the temperature of the reaction mixture at equilibrium were decreased?

a) The concentration of C_2H_6 will decrease.
b) The concentration of both C_2H_2 and H_2 will increase.
c) There will be no change in the equilibrium concentrations.
d) The concentration of both C_2H_2 and H_2 will decrease.

25. Calculate the pH of a solution that has $[H_3O^+] = 1.0 \times 10^{-6}$M.

a) pH = 1.00
b) pH = 14.00
c) pH = 7.00
d) **pH = 6.00**

26. If the pH of a solution is 7, the solution will be:

a) Acidic
b) Neutral
c) Alkaline
d) None of these

27. Fill in the blanks: 3.00 moles of oxygen gas (O_2) have a weight of ---------- g , and occupy volume of ---------- L at STP.

a) 96.0 g , 1.00 L
b) 64.0 g , 22.4 L
c) 64.0 g , 3.00 L
d) 96.0 g , 67.2 L

28. The reaction in which increased pressure has no effect on the equilibrium reaction is

a) $N_2(g) + 3\ H_2(g) \rightleftarrows 2\ NH_3(g)$
b) $2\ H_2(g) + CO(g) \rightleftarrows CH_3OH(\ell)$
c) $CaCO_3(s) \rightleftarrows CaO(s) + CO_2(g)$
d) $CO(g) + H_2O(g) \rightleftarrows CO_2(g) + H_2(g)$

29. The equilibrium constant for the following reaction: N2(g) + 3H2(g) 2NH3(g) is 70 at 350°C. A system at equilibrium has $[N_2] = 0.100$ M and $[H_2] = 0.200$ M. What is the $[NH_3]$?

a) 0.371
b) 0.195
c) 0.237
d) 0.302

30. Kp will be equal to Kc if _____.

a) $\Delta n = 0$
b) $\Delta n = 1$
c) $RT = 0$
d) $\Delta n = \infty$

31. The correct order of radius in the following is

a) Cl- <Cl
b) $O^{-2} > O$
c) $Fe^{+2} > Fe$
d) $Fe^{+2} < Fe^{+3}$

32. All the following compounds are aliphatic except? **(D)**

a) CH_3-CH_2-CH_3
b) CH_3-CH_2=CH_2
c) CH_3-C≡ CH
d) 

33. Which of these elements has the greatest electronegativity?

a) $_{51}Sb$
b) $_{33}As$
c) $_{31}Ga$
d) $_{55}Cs$

34. The cobalt(III) ion, Co^{3+}, has how many 3d electrons?

a) 0
b) 7
c) 6
d) 5

35. Which one of these elements (period 4) is a transition element?

a) Br
b) As
c) Sc
d) Ca

36. The correct order in the first ionization energy is:

a) N > O > C > Si
b) Si > O > N > C
c) O > N > C > Si
d) C > N > O > Si

37. The general formula of an alkane is

a) C_nH_{2n+2}
b) $C_{2n}H_{2n}$
c) C_nH_{2n}
d) C_nH_{2n-2}

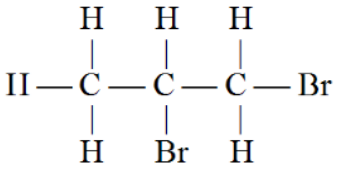
38. The functional group in this compound $CH_3CH_2CH_2CH_2NH_2$is

a) Ketone
b) Aldehyde
c) Amine
d) Ether

39. An amino acid is a compound that contains at least

a) One amino group and one amide group.
b) Two amino groups and one carboxylic acid group.
c) One hydroxyl group and one methyl group.
d) One carboxylic acid group and one amino group.

40. Which of these is the systematic name for the compound represented below?



a) 2,3-dibromopentane
b) 1,2-dibromopentane
c) 2,3-dibromopropane
d) 1,2-dibromopropane

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]	ununununium 111 Uuu [272]	unubium 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
**Actinide series	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]