



Date: 11 / 12 /2022

Name :

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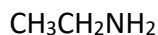
Student No.:

1 H Hydrogen 1.01																		2 He Helium 4.00													
3 Li Lithium 6.94	4 Be Beryllium 9.01																	5 B Boron 10.81	6 C Carbon 12.01	7 N Nitrogen 14.01	8 O Oxygen 16.00	9 F Fluorine 19.00	10 Ne Neon 20.18								
11 Na Sodium 22.99	12 Mg Magnesium 24.31																	13 Al Aluminum 26.98	14 Si Silicon 28.09	15 P Phosphorus 30.97	16 S Sulfur 32.07	17 Cl Chlorine 35.45	18 Ar Argon 39.95								
19 K Potassium 39.10	20 Ca Calcium 40.08	21 Sc Scandium 44.96	22 Ti Titanium 47.87	23 V Vanadium 50.94	24 Cr Chromium 52.00	25 Mn Manganese 54.94	26 Fe Iron 55.85	27 Co Cobalt 58.93	28 Ni Nickel 58.69	29 Cu Copper 63.55	30 Zn Zinc 65.39	31 Ga Gallium 69.72	32 Ge Germanium 72.61	33 As Arsenic 74.92	34 Se Selenium 78.96	35 Br Bromine 79.90	36 Kr Krypton 83.80														
37 Rb Rubidium 85.47	38 Sr Strontium 87.62	39 Y Yttrium 88.91	40 Zr Zirconium 91.22	41 Nb Niobium 92.91	42 Mo Molybdenum 95.94	43 Tc Technetium (98)	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.91	46 Pd Palladium 106.42	47 Ag Silver 107.87	48 Cd Cadmium 112.41	49 In Indium 114.82	50 Sn Tin 118.71	51 Sb Antimony 121.76	52 Te Tellurium 127.60	53 I Iodine 126.90	54 Xe Xenon 131.29														
55 Cs Cesium 132.91	56 Ba Barium 137.33	57 La Lanthanum 138.91	72 Hf Hafnium 178.49	73 Ta Tantalum 180.95	74 W Tungsten 183.84	75 Re Rhenium 186.21	76 Os Osmium 190.23	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.97	80 Hg Mercury 200.59	81 Tl Thallium 204.38	82 Pb Lead 207.2	83 Bi Bismuth 208.98	84 Po Polonium (209)	85 At Astatine (210)	86 Rn Radon (222)														
87 Fr Francium (223)	88 Ra Radium (226)	89 Ac Actinium (227)	104 Rf Rutherfordium (261)	105 Db Dubnium (262)	106 Sg Seaborgium (266)	107 Bh Bohrium (264)	108 Hs Hassium (269)	109 Mt Meitnerium (268)																							
																		58 Ce Cerium 140.12	59 Pr Praseodymium 140.91	60 Nd Neodymium 144.24	61 Pm Promethium (145)	62 Sm Samarium 150.36	63 Eu Europium 151.96	64 Gd Gadolinium 157.25	65 Tb Terbium 158.93	66 Dy Dysprosium 162.50	67 Ho Holmium 164.93	68 Er Erbium 167.26	69 Tm Thulium 168.93	70 Yb Ytterbium 173.04	71 Lu Lutetium 174.97
																		90 Th Thorium 232.04	91 Pa Protactinium 231.04	92 U Uranium 238.03	93 Np Neptunium (237)	94 Pu Plutonium (244)	95 Am Americium (243)	96 Cm Curium (247)	97 Bk Berkelium (247)	98 Cf Californium (251)	99 Es Einsteinium (252)	100 Fm Fermium (257)	101 Md Mendelevium (258)	102 No Nobelium (259)	103 Lr Lawrencium (262)

Q 1. Which compound will not exhibit hydrogen bonding in the liquid state? and why?



or



Q 2: circle the correct answer:

1. For small molecules of comparable molecular weight, which one of the following choices lists the intermolecular forces in the order of increasing strength?

- a. hydrogen bonds < dipole–dipole forces < London forces
- b. dipole–dipole forces < hydrogen bonds < London forces
- c. London forces < hydrogen bonds < dipole–dipole forces
- d. London forces < dipole–dipole forces < hydrogen bonds

2. The property that measures or describes the magnitude of resistance to flow in a liquid is called

- a. viscosity
- b. malleability
- c. surface tension
- d. vapor pressure

3- Which of the following intermolecular forces is **INCORRECTLY** assigned as the principal force in the compound given?

- a. CCl_4 , London
- b. NH_3 , London
- c. HF , H-bonding
- d. CH_3OH , H-bonding

4- Which gaseous substance would have the highest solubility in water?

- a. CO_2
- b. NH_3
- c. O_2
- d. none

5- Which of the following gases is least soluble in water?

- a. CO_2
- b. SO_3
- c. NH_3
- d. N_2

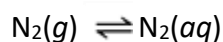
6-Which of the following pure liquids is the best solvent for carbon disulfide CS₂?

- a. C₆H₆(l)
- b. NH₃(l)
- c. CH₃OH(l)
- d. H₂O(l)

7-Which of the following compounds is least soluble in water?

- a. CH₃CH₂CH₂NH₂
- b. CH₃CH₂CH₂F
- c. CH₃CH(OH)CH₃
- d. CH₃CH₂COOH

8- Consider the following gas-liquid equilibrium for an aqueous system at a constant partial pressure of N₂.



What is the effect on the equilibrium composition of the liquid when the temperature of the liquid is increased?

- a. The amount of N₂ dissolved in the liquid increases.
- b. The amount of N₂ dissolved in the liquid decreases.
- c. The amount of N₂ dissolved in the liquid does not change.
- d. Not enough information is provided to answer the question.

9- The solubility of 1-pentanol in water is 2.7 g per 100 g of water at 25°C. What is the maximum amount of 1-pentanol that will dissolve in 4.1g of water at 25°C?

- a. 0.11 g
- b. 0.65 g
- c. 2.7 g
- d. 11 g

10- In general, which of the following type(s) of solid(s) would exhibit the greatest solubility in a polar solvent?

- a. network covalent
- b. ionic or polar molecular
- c. ionic
- d. metallic
- e. polar molecular

11- Which of the following compounds has the highest normal boiling point?

- a. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$
- b. $\text{CH}_3\text{CH}_2\text{CH}_3$
- c. $\text{CH}_3\text{CH}_2\text{OH}$
- d. CH_3OCH_3

12-At a particular temperature the solubility of O_2 in water is 0.590 g/L at an oxygen pressure of around 15.2 atm. What is the Henry's law constant for O_2 (in units of L · atm/mol)?

- a. 3.88×10^{-2}
- b. 8.26×10^2
- c. 2.80×10^{-1}
- d. 1.21×10^{-3}

13-Which compound has the lowest standard enthalpy of vaporization at 25°C?

- a. C_6H_{14}
- b. C_8H_{16}
- c. C_5H_{12}
- d. C_8H_{18}

14- Which of the following best describes carbon dioxide (CO_2) at room temperature and pressure?

- a. ionic solid
- b. nonpolar molecular gas
- c. metallic solid
- d. covalent network solid

15-If two fluids do not mix but, rather, form two layers, they are said to be ____.

- a. immiscible
- b. miscible
- c. homogeneous
- d. identical

16-The molarity of a solution is defined as the

- a. moles of solute per liter of solvent.
- b. grams of solute per kilogram of solvent.
- c. grams of solute per liter of solution.
- d. moles of solute per liter of solution.

e. moles of solute per kilogram of solvent.

Q 3. Answer the following question:

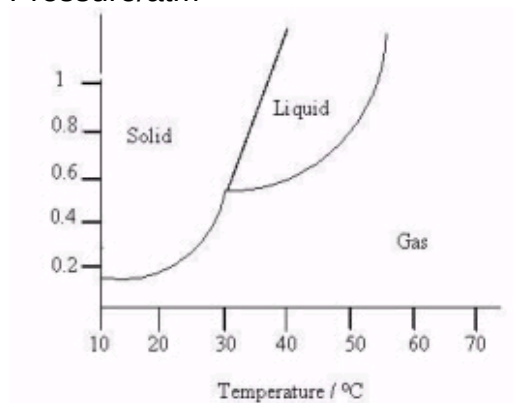
- a- What is the mass percent of an aqueous sodium hydroxide solution in which the molarity of NaOH is 9.98 M? The density of the solution is 1.33 g/mL.
- b- If 11.2 g of naphthalene, $C_{10}H_8$, is dissolved in 107.8 g of chloroform, $CHCl_3$, what is the molality of the solution?
- c- Calculate the mole fraction of ethyl alcohol, C_2H_5OH , in a solution that contains 5 mol of C_2H_5OH (46 g/mol) and 3.7 mol of benzene, C_6H_6 (84g/mol).

Q 4. What is the enthalpy of vaporization of a compound that has a vapor pressure of 151 mmHg at 247 K and 1.52 mmHg at 187 K? ($R = 8.31 \text{ J}/(\text{K} \cdot \text{mol})$)

Bonus: Q 5. How much heat (in kilojoules) is needed to convert 866 g of ice at -10°C to steam at 126°C ? (The specific heats of ice, water and steam are $2.03 \text{ J/g} \cdot ^\circ\text{C}$, $4.184 \text{ J/g} \cdot ^\circ\text{C}$ and $1.99 \text{ J/g} \cdot ^\circ\text{C}$, respectively.) $\Delta H_{\text{fusion}} = 6.01 \text{ KJ/mol}$, $\Delta H_{\text{vaporization}} = 40.79 \text{ KJ/mol}$

Q 6 . Answer the question for the following diagrams.

Pressure/atm

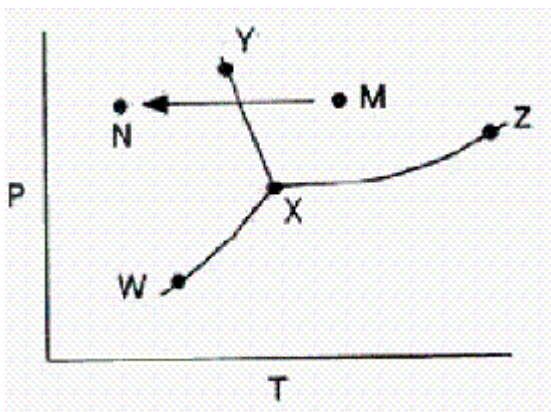


1. At what temperatures do the triple point occur?

2. What is the boiling point of this substance?

3. Is this the phase diagram for water? Why or why not?

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1. process for change of M to N is:

2. The state in point Y is:

3. The state in point X is:

4. The state in point N is:

Good Luck