**Navrachana University**
**School of Liberal Studies and Education, B.Sc.**
**End-Semester Examination May 2017**
**1st Year and Semester – II**
**Matter, CH107**

**Date:** 9th May, 2017 **Total Marks: 40**

**Time:** 10.30AM to 12.30PM

*Important Instructions*

1. ***All sections are compulsory. Please read the questions carefully and answer accordingly.***
2. ***Scientific Calculator is allowed.***
3. ***This question paper contains FIVE pages.***

**SECTION A: Multiple Choice Questions** **[Marks = 20]**

1. Which of the following is false about gases
   a. The molecules possess random movement in all directions
   b. Gases intermix freely without the help of external agency
   c. They are highly compressible
   d. They possess definite volume.

2. Two gases X and Y are at same temperature and pressure. The reduced temperature of X is below unity while that of Y is above unity. Thus,
   a. X can be liquefied by compression but not Y
   b. Y can be liquefied by compression but not X
   c. both X and Y can be liquefied by compression
   d. none of the statement is correct.

3. Liquefication of gases cannot be achieved by
   a. cooling
   b. compressing the gas at all temperatures
   c. compressing the gas as well as cooling
   d. compressing the gas below critical temperature.

4. A pressure of 0.101325 bar when expressed in atmospheres represents
   a. 0.01 atm
   b. 1 atm
   c. 0.1 atm
   d. 10 atm.

5. Which of the following statement is false?
   a. The product PV for fixed amount of gas is independent of temperature.
   b. Molecules of different gases have same KE at a given temperature.
   c. The gas equation is not valid at high pressure and low temperature.
   d. The gas constant per molecule is known as Boltzman constant.

6. An ideal gas is at pressure P and temperature T, in a box which has been placed in another evacuated large container. The inner box is pricked so that the gas inside it starts escaping out. What is correct?
   a. the temperature falls
   b. the temperature rises
   c. the temperature remains the same
   d. unpredictable.

7. The bottle of liquid ammonia is cooled before opening the seal so as to lower its
   a. vapour pressure
   b. surface tension
   c. viscosity
   d. extent of H-bonding.

8. The magnitude of van der Waals forces depends upon
   a. molecular size
   b. number of electrons in the molecule
   c. polarisability of molecules
   d. all the above factors.

9. Rate of evaporation of a liquid does not depend upon
   a. nature of liquid
   b. temperature
   c. Atmospheric pressure
   d. Size of vessel.

10. Which of the following is not a property of crystalline solid?
   a. Isotropy
   b. Anisotropy
   c. Sharp melting point
   d. Definite geometry.

11. NaCl is an example of
   a. ionic solid
   b. covalent solid
   c. metallic solid
   d. molecular solid.

12. When a cation leaves its normal position in the crystal and moves to some interstitial space, the defect in the crystal is known as
   a. Schottky defect
   b. F-centre
   c. Frenkel defect
   d. Non-stochiometric defect.

13. A crystal may have one or more planes of symmetry as well as one or more than one axis of symmetry but it has only
   a. two centres of symmetry
   b. one centre of symmetry
   c. four centres of symmetry
   d. no centre of symmetry.

14. During evaporation of liquid
   a. temperature of liquid will rise
   b. temperature of liquid will fall

c. temperature of liquid may rise or fall depending upon its nature
d. temperature of liquid remains unaffected.

15. Number of mirror planes in a cube is
    a. 4
    b. 6
    c. 9
    d. 5

16. Ionic solids with Schottky defects contain in their structures
    a. equal number of cation and anion vacancies
    b. interstitial anions and anion vacancies
    c. cation vacancies only
    d. cation vacancies and interstitial cations.

17. If two solutions A and B are separated by a semipermeable membrane and if the liquid flows from A to B, then
    a. A is more concentrated than B
    b. A is less concentrated than B
    c. Both solutions have same concentration
    d. No information is available regarding relative concentrations

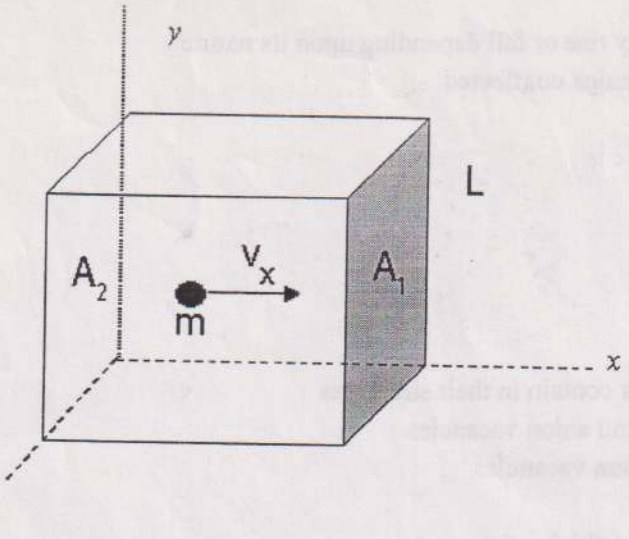
18. Which statement is not true?
    a. particles in a colloid will reflect light
    b. the particles of a solution are molecule in size
    c. a suspension can be filtered
    d. a solution can be filtered

19. What factor distinguishes a suspension from a colloid?
    a. light reflects off the particles of a suspension
    b. the particles of a suspension will sink out if left over time to rest
    c. suspensions are clear
    d. suspensions cannot be filtered

20. A suspension is formed from uniform particles of solid, of diameter 10 Mm, suspended in a solvent. What is the best description of this system?
    a. Monodisperse and coarse
    b. Monodisperse and colloidal
    c. Polydisperse and coarse
    d. Polydisperse and colloidal

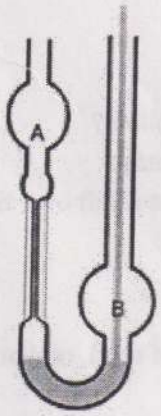
**SECTION B: Answer any TWO of the following.**

1. Consider a cube (as shown in the image given below) having each side equal to L cm. Let one mole of the gas consisting of N molecules be present in it and m be the mass of each molecule. **[Marks = 10]**




According to Maxwell's distribution of velocities, we know that the molecules are moving with different velocities in all the directions. Derive kinetic gas equation by considering a single molecule having velocity equal to V cm/sec at a particular time.

2. a) The time of flow of water through the glassware shown in the image given below is 1.48 minutes. For the same volume of a liquid of density 0.792 gm/mL, it is 2.42 minutes. **[Marks = 5]**

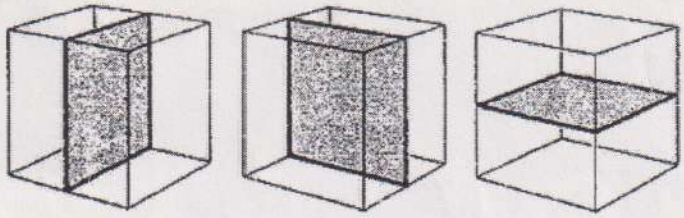



Find the viscosity of the liquid relative to that of water and also absolute viscosity at 20°C. Density and viscosity of water at 20°C are 0.995 gm/mL and 10.02 millipose respectively.

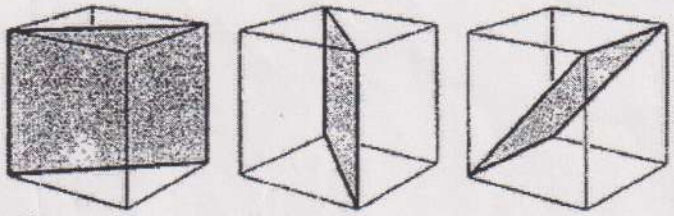
b) What is soap? Explain cleaning action of soap? **[Marks = 3]**

c) Explain what is surfactant and different types of surfactants. **[Marks = 2]**

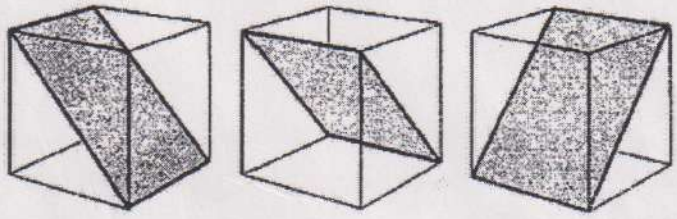
3. Explain the following images with respect to element of symmetry. **[Marks = 10]**



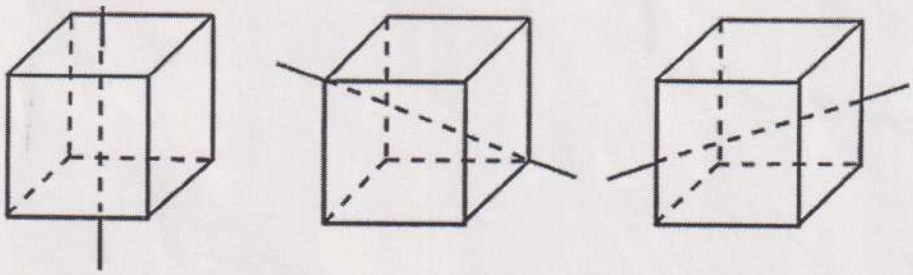
(a) (b) (c)



(d) (e) (f)



(g) (h) (i)



(j) (k) (l)