MILLLENIUM SCIENTIFIC CAFÉ

BRAINSTORMING TEST (COLLIGATIVE PROPERTIES)

DURATION:1 HOUR TEST

NAME:……..

SIGNATURE:……..

1.a) (i) Explain what is meant by the term colligative property of a solution.

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(ii) Give four examples of these properties in (a) (i) above.

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(b) (i) The vapour pressure of a solvent at 25°C is 3.15X103 Nm-. Calculate the vapour pressure of a solution of 6.0 g urea, CO (NH2)2 in 100 g of water at the same temperature.

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(ii) The vapour pressure of a solution of 29.0 g of a substance X in 100 g of water at 50°C is 1.12 X 104 Pa. if at the same temperature, the vapour pressure of water alone was 1.22 x 104 Pa, Calculate the molecular mass of X.

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2.The osmotic pressure of various concentrations of solute X in methyl benzene are given in the table below.

Concentration/ gdm-3	1.0	2.0	3.0	4.0	5.0	6.0
Osmotic pressure/Nm-2	23	37	53	75	92	109

(a) Plot a graph of osmotic pressure against concentration.

(b) Use the graph you have drawn to determine the molar mass of X

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3. (a) A n aqueous solution containing 9.0 g of glucose (C6H12O6) in 250 cm3 of water freezes at the same temperature as an aqueous solution containing 1.46 g of sodium chloride in 250 cm3 of water.

(i) Explain what is meant by the term Freezing point depression constant.

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(ii) Calculate the relative molecular mass of sodium chloride in water.

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(iii) State any two assumptions made in a (ii) above.

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(b) Compare your results in a (ii) above with the theoretical R.F.M of sodium chloride.

Explain the differences between the two values.

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4.a) State three limitations of the cryoscopic method of determining molar mass of solute.

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b) The freezing point of solution containing 4.2 g mannitol dissolved in 50g of naphthalene was found to be 77.030C. Calculate the molar mass of mannitol. (Kf of naphthalene =6.870C) and the freezing point of pure naphthalene was found to be 80.2 0C. c)

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State how the molar mass of manifold would be affected if association occurs in naphthalene. Give a reason for your answer

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The freezing point of various concentration of a non volatile solute K in water at 1atm isgiven in the table below.

Concn./ gdm-3	0	20	40	60	80	100	120	140
Freezing point/°C	0	-0.11	-0.22	-0.32	-0.43	-0.54	-0.65	-0.76

(a) Plot a graph of freezing point depression against concentration.

(b) Use the graph you have drawn to determine the RMM of K given Kf of water is 1.86°Cmol-1Kg-1

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