Senior Chemistry Olympiads Question

1. The equation below shows a redox reaction . Study it and answer the questions that follow.

YS2032- + I2  → S4062- + X I-

1. Letter Y and X make the equation to be balanced and they are coefficients of the species shown. Find the coefficients of Y and X [2]
2. From the above equation, which species is
3. Reduced
4. Oxidized
5. And Oxidant
6. A reductant
7. During a tiltration reaction, 25cm3 of iodine solution (I2) required 18.0cm3 of 0.2mol/dm3 sodium thiosulphate ( Na2S2O32- ) for a complete reaction. Using the equation above. calculate the concentrations of iodine solutions. [6]

Solutions

1. Y is 2 and X is 2.
2. YS2032- has been oxidised
3. Iodine has been reduced
4. YS2032- is a reductant
5. Iodine is an oxidant
6. Moles of 2S2032-  = concentration x volume

= [18/1000] x 0.2mol/dm3

= 0.018dm3 x 0.2 mol/dm3

= 0.0036 moles of 2S2032-

In the equation:

2 moles of 2S2032-  → 1mol of iodine

0.0036 moles → x

X = 0.0018 of iodine

Therefore concentration will be;

[ ] = moles/ volume

= 0.0018/[25/1000]

**= 0.072mol/dm3  of iodine**

QUESTION ONE

1. A commercial sulphuric acid solution has a density of 1.45g/cm3 and is 55% H 2SO 4
2. What is meant by the term molarity?
3. What is the molarity of this solution?

Using this commercial sulphuric acid solution, show how you would prepare 500cm 3  of 1.00M aqueous H 2SO 4 .

B. I. determine the simplest formula for compounds with the following compositions

a. 62.05% C, 10.4% H and the remainder O

B. 26.57%K, 35 .36% Cr and 38.07% O

II. state one difference between molecular formula and structural formula

**ANSWERS.**

1. i. Molarity is the number of solutes per cubic decimetre. It is equal to the number of moles divided by the volume.

Molarity of H 2SO 4 .

From density

Mass of H 2SO 4 i 1dm3