b) i) Arrange the species T, T^- and T^+ in increasing order of size. (1mk)

T^+, T, T^-

ii) Which of the ions X^{2+} and X^{2-} is the most stable ? Explain. (2mks)

X^{2-}, gains electrons to attain an octet state

23. (a) What would be observed if sulphur IV Oxide is bubbled through acidified potassium chromate VI (1mk)

The orange acidified potassium chromate(VI) turns to green.

(b) In experiment sulphur IV Oxide was dissolved in water to form solution M.

(i) State the observation made if a few drops of barium chloride solution immediately added to solution M (1mk)

White ppt is formed

(ii) Identify the spectator ions from the reaction b(i) above (1mk)

H^+ and Cl^-

24. Copper-64 has a half life of 12.8days.

a) What is meant by the term half life (1mk)

Time taken for a given mass of nuclide to decay to half of it's original mass

b) What mass of a copper-64 will be left after 51.2 days starting with 20 g of the isotopes

$\frac{51.2}{12.8} = 4$ $\left(\frac{1}{2}\right)^4 \times 20 = 1.25\,g$ (2mks) (1mk)

c) Give one use of radioactive isotopes in medicine (1mk)

Destroy cancerous cell/sterilisation of surgical instrum
Monitor growth of bones (Any other)

25. a) Zeolites (Na_2X) is a complex compound used to soften hard water in the ion-exchange methods according to the equation below.

$Ca^{2+}(aq) + 2NaX(aq) \longrightarrow CaX_{(s)} + 2Na^+_{(aq)}$

After sometimes the Zeolites get exhausted and ceases to soften water. Write a reaction to show how Zeolite is regenarated. (1mk)

$CaX_{(s)} + 2NaCl_{(aq)} \rightarrow CaCl_{2(aq)} + Na_2X_{(s)}$