Chemistry 2.6 AS 91166 Demonstrate understanding of chemical reactivity

Writing Excellence answers to **Equilibrium – Concentration** questions

Equilibrium – Concentration QUESTION	
Question: When acid is added to a yellow solution of chromate ions, $CrO_4^{2-}(aq)$, the following equilibrium is established. $2CrO_4^{2-}(aq) + 2H^+(aq) \leftrightarrow Cr_2O_7^{2-}(aq) + H_2O(l)$ **yellow** **orange** Analyse this equilibrium using equilibrium principles to explain the effect on the colour of the solution when: (i) more dilute acid is added **AND** when (ii) dilute base is added:	
ANSWER	
1. State the **equilibrium principle**	When a change is made to a system that is at equilibrium, the system responds to **reduce the effect** of that change.
2. Describe the **factor** in your question AND Link the principle to how the **system responds to increasing or decreasing concentration** of reactants	The factor in the question above is **concentration of reactants.** If there is an increase in concentration of reactants, the system responds by increasing the rate products are made. If there is a decrease in concentration of reactants, the system responds by decreasing the rate products are made.
3. **Generally,** explain which side of the equation is favoured (relate to reactants or products) by increasing or decreasing concentration	An increase in concentration of reactants **favours the forward reaction,** and a decrease in concentration of reactants **favours the reverse reaction.**
4. **Specifically,** for your reaction explain how you are increasing the concentration of reactants, AND link the direction of reaction that would be favoured	Adding dilute acid increases the concentration of the acid, one of the reactants, so the reaction moves in the forward direction and favours the products, therefore it will increase the rate that the added acid is 'used up'
5. Describe how the **system shift** by increasing the concentration of reactants would affect which substances are made AND final observation.	More $Cr_2O_7^{2-}(aq)$ would be produced and the solution would turn more **orange**.
6. **Specifically,** for your reaction explain how you are decreasing the concentration of reactants, AND link the direction of reaction that would be favoured	Adding base means that acid that reacts with the base is removed from the equilibrium (by neutralisation) and the concentration of the acid decreases. This will drive the equilibrium in the backwards direction and this favours the reactants to increase the rate of replacing the H^+ "used up"
7. Describe how the **system shift** by decreasing the concentration of reactants would affect which substances are made AND final observation.	More $CrO_4^{2-}(aq)$, would be produced and the solution would turn more **yellow**.

NOTE: The white column is how your answer would appear on your test paper so make sure you **write out complete sentences**. The grey area is just to help you structure your answer and would not appear in the question.