Guiding Question revisited

How can the extent of a reversible reaction be influenced?

In this chapter we have considered the following features of reversible reactions:

- [ ] A dynamic equilibrium is reached:
  - in a closed physical or chemical system;
  - when the rates of forward and backward reactions are equal and the concentrations of reactants and products remain constant.
- [ ] The equilibrium constant, K, can be determined from the stoichiometry of a reaction and the equilibrium concentrations of reactants and products.
- [ ] The magnitude of K indicates the extent of reaction at a given temperature.
- [ ] The equilibrium law:
  - states that every reaction will have a particular value of K at a given temperature;
  - can be used to quantify the composition of an equilibrium mixture.
- [ ] Le Châtelier's principle can be used to predict changes in equilibrium position when a system is subject to changes in concentration, pressure and temperature. It states that *a system at equilibrium when subjected to a change will respond in such a way as to minimize the effect of the change*. Therefore:
  - an increase in concentration of reactants will shift the equilibrium towards the products and vice versa; K remains unchanged;
  - an increase in pressure will shift the equilibrium towards the side of the reaction with the least gaseous molecules and vice versa; K remains unchanged;
  - an increase in temperature will shift the equilibrium in the endothermic direction and vice versa; K changes at different temperatures;
  - the use of a catalyst has no effect on the position of equilibrium as it increases the forward and backward rate by equal amounts; K remains unchanged.