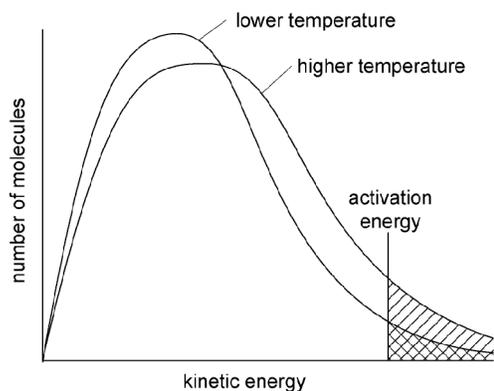


# Reaction Rates Answers

1 (a)



(b) A decrease in temperature decreases the molecular kinetic energy, so there are fewer collisions with energy more than the activation energy. Fewer collisions result in a reaction as indicated by the smaller shaded area on the graph.

2 (a) Activation energy is the minimum energy

required, in a molecular collision, for the molecules to react. (Activation energy is the energy barrier.)

(b) A catalyst speeds up a chemical reaction without being used up.

(c) Catalysts work by providing an alternative reaction route of lower activation energy.

3 (a) High pressure means there are more molecules in

the same volume (than at a low pressure), so the molecules are closer together. The number of collisions increases, so the reaction rate increases. (This is similar to changing the concentration.)

(b) An iron catalyst is added to speed up the reaction rate, so that more product is made per day. If more ammonia is made, more money is made.

4 The reaction of white phosphorus with oxygen has a very low activation energy, so that molecules at room temperature have enough energy to react.

5 (a) The reaction of nitrogen and oxygen has a high

activation energy (owing to the very strong covalent triple bonds inside the nitrogen molecules).

(b) A catalyst could be used, or the air could be heated.