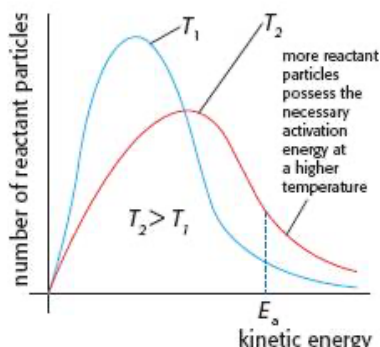


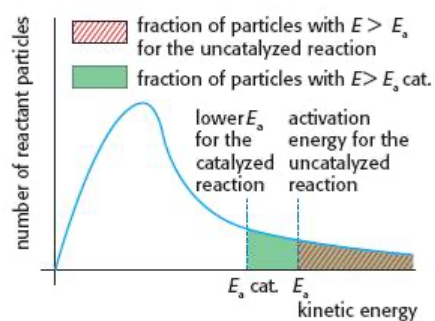
## SL & HL Answers to Collision theory questions

- Before particles can react they must collide with each other. The rate of reaction will depend upon the frequency of the collisions, the appropriate orientation of the collisions and the number of collisions in which the reactant particles possess at least the minimum activation energy.
- Initial heating speeds up the rate of reaction. Particles gain kinetic energy and more will possess the minimum activation energy necessary for the reaction to occur. There will also be more frequent collisions.
  - Once sufficient  $\text{Mn}^{2+}(\text{aq})$  ions have been formed they can catalyse the reaction. They do this by providing an alternative pathway with a lower activation energy. More reactant particles will therefore possess this lower activation energy and heating is no longer required.
- The area under each curve is related to the number of particles, as the number of particles is fixed the two areas must be equal.

ii.



iii.



- The methane explosion causes the coal dust in the mine to go into the air increasing the surface area so that it reacts fast to cause a huge explosion. Limestone is inert to combustion so as it also goes into the air it decreases the surface area of the coal dust. (A minimum of 65% of the dust is required to be non-combustible to be effective).