Catalysis work in three stages;
Adsorption- Formation of bonds with the metal may use some of the electrons from bonds within the gas molecules thus weakening these bonds and making a subsequent reaction easier.
Reaction- Adsorbed gases may be held on the surface of the metal in just the right orientation for a reaction to occur. This increases the chances of favourable collisions taking place.
Desorption- The products are then released from the active sites

HARD Hetero= Adsorption + Reaction +Desorption

This adsorption can modify the molecules into more reactive species by;

- Holding a molecule in a more favourable configuration for reaction to occur. This will reduce the activation energy.
- Weakening reactant bonds making them break more easily into reactive fragments. This will reduce the activation energy
- Concentration of reactants on a surface will be increased, increase collision rates of reactant molecules

Efficiency of a catalyst will depend on how strongly or weakly the reactant molecules are adsorbed on the catalyst surface.
If the adsorption is weak it will mean the reactant molecules are not held long enough to increase collision rate. Silver is not a good catalyst as there are few d- orbitals available for bonding with the reactant molecules so it adsorbs too weakly
If only a partial reaction is wanted, a weak catalyst allows the desorption before further oxidation can occur.
If the adsorption is too strong, the molecules will remain stationary on the surface and fail to regenerate the active sites. Surface will become 'poisoned' by the reactant molecules.
Poisoning- Impurities in a reaction mixture become adsorbed too strongly on the active sites on the catalyst. Sulphur compounds have a tendency to poison transition metal catalyst. Lead in petrol poisons catalytic converter.
Tungsten is too strong catalyst.
A good catalyst will have a balance between efficient absorption of reactants and desorption of product. Nickel and platinum achieve this balance and are generally excellent catalyst.

Homogeneous Catalyst

- Catalyst is in same phase as reactants
- Transition metal compounds are often good at speeding up homogeneous chemical reactions due to their ability to alter oxidation state

For example;
Oxidation of iodide ions by peroxodidisulphate(VI) ions can be catalysed by either iron(II) and iron(III)
$2I^-(aq) + S_2O_8^{2-}(aq) \rightarrow I_2(aq) + 2SO_4^{2-}(aq)$
The reaction is susually slow due to oppositely charged ions. Presence of iron(II) allows the peroxdisulphate(VI) ions to oxidise the iron(II) to iron(III) and then the ioide ions reduce iron(III) to iron(II). Both reactions are between opposite ions so are much faster;
$2Fe^{2+} + S_2O_8^{2-} >>>> 2Fe^{3+} + 2SO_4^{2-}$
$2I^- + 2Fe^{3+} >>>> I_2 + 2Fe^{2+}$