Questions from the "PAL Prüfungsbuch"
Important Large Scale Manufacturing Processes

489: Which end products are obtained if a sodium chloride solution is electrolyzed on a large-scale?

1) Chlorine, caustic soda, hydrogen
2) Chlorine, sodium, hydrogen
3) Chlorine, sodium
4) Hydrochloric acid, caustic soda
5) Hydrochloric acid, hydrogen

490: How is chlorine produced on a large scale?

1) By neutralisation of hydrochloric acid
2) By dissoziation of sodium chloride solution
3) By electrolysis of sodium chloride solution
4) By hydrolysis of sodium chloride solution
5) By hydrogenation of chloride ethene

491: How is chlorine obtained on a large scale?

1) By fused-salt electrolysis of fluor-spar
2) By anodic oxidation of chloride ions
3) By heating of sodium chlorite
4) By chemical reaction of sodium chloride with concentrated sulphuric acid
5) By reduction of hydrochloric acid

492: Which of the following statements about the chlorine production by use of the membrane procedure is correct?

1) The membrane must have a high permeability for Na^+ ions and must impermeable for Cl^- ions.
2) It is neccessary to permanently discharge water in this procedure
3) The brine must only have a low purity
4) Chlorine is not contaminated with any other gas
5) This technology is more energy-intensive then other technologies to produce chlorine

493: What happens if during the chloralkali electrolysis for the production of caustic soda it is *not* prevented that lye comes into contact with chlorine?

1) Elementary chlorine disproportionates with hydroxide ions to hypochlorite and chloride ions
2) An explosive mixture is formed
3) Caustic soda is contaminated with chlorine
4) Chlorine reacts with lye to sodium chloride which precipitates
5) The electron flow of the electrolysis is disrupted

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

494: Which type of catalysis is used to produce ammonia on a large scale?

1) Photocatalysis
2) Homogeneous catalysis
3) Autocatalysis
4) Heterogeneous catalysis
5) Biocatalysis

495: How does the increase of temperature and pressure influence the ammonia-equilibrium?

1) Increased pressure affects the yield negatively, increased temperature enhances it favourably
2) Pressure affects the yield positively, an increase of temperature accelerates the reaction but reduces the yield
3) An increase of temperature slows the reaction rate down, rising the pressure reduces the yield
4) Both measures lead to an increase of yield
5) According to the principle of least compulsion an increase of pressure lead to a reduced yield, the rise of temperature is irrelevant

496: Despite the fact that an increase of temperature leads to a reduced yield of ammonia, temperatures of 450°C and more are applied in the synthesis of ammonia. Why?

1) Because temperatures below 450°C will lead to a poorer yield
2) Because the capacity of autoclaves is too small below 450°C
3) Because the catalyst is too effective below 450°C
4) Because ammonia will again disintegrate below 450°C
5) Because the reaction rate is too low below 450°C

497: Why is the production of ammonia by the Haber-Bosch-process carried out at very high temperatures (approx. 750K)?

1) Thereby the reaction equilibrium is shifted to the product side
2) With lower temperatures the percentage of by-products would be too high
3) With lower temperatures the reaction rate would be too low
4) With lower temperature the ammonia would remain adsorbed to the catalyst
5) Thereby the use of a catalyst can be avoided

498: How is methanol produced technically?

1) By reduction of formaldehyde
2) By hydrolysis of chloromethane
3) By dry destillation of wood
4) By peroxide splitting of toluene within the synthesis of phenol
5) By catalytic hydrogenation of carbon monoxide

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

499: Which if the named substances are applied for the large scalel production of methanol?

1) Carbon monoxide and water vapour
2) Carbon monoxide and hydrogen
3) Carbon dioxide and water
4) Calcium carbide and water
5) Methane and water

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.