Exercises 8

1 What among the following are general properties of metals?*
   a) high electrical and thermal conductivity
   b) high density (specific weight)
   c) a large variation in specific weight
   d) high chemical reactivity

2 Name examples (two in each case) for metals which would fulfill the following requirements:
   a) low specific weight (low density in g/ml)
   b) high resistance against corrosion
   c) high conductivity for electricity and heat

3 Which macroscopic properties of metals can be assigned to the extensive delocalization of the electrons in a metallic bond?

4 Explain the general structure of polymers. Give an example.

5 Try to give a general definition of
   a) a polymer
   b) a polyolefin
   Name an individual example in each case.

6 Name three important differences between the physical properties of polymers and metals.

7 Which of the following properties is typical for cross-linked polymers as opposed to non-cross-linked ones?*
   a) high brittleness
   b) do not melt, but decompose at high temperatures
   c) low specific weight

8 Which class of polymers is most suitable for recycling purposes? Which other class represents a major problem? Why?

9 Which of the following chemical elements typically occur in ceramics?*
   a) zinc (Zn)
   b) helium (He)
   c) aluminum (Al)
   d) oxygen (O)

10 What statement regarding ceramic materials do you consider to be correct?*
   a) ceramics very often contain the elements aluminum and oxygen
   b) ceramics consist of chain-like macromolecules
   c) continuous volume expansion is observed during the formation of ceramics
   d) ceramics never contain any metallic elements
   e) ceramics can be manufactured either in a wet or in a dry process

11 Why are ceramic parts for engineering purposes (valves, brakes etc.) often expensive and therefore limited to unique high-performance applications?

* One or several answers may be correct. Please indicate appropriately by repeating the assignments a), b), c), … followed by the statements "right" or "wrong" on your answer sheet.