

Tentamen Economic Minerals and Rocks TA3140

25 Januari 2010

Tijd: 9:00 – 12:00 h

Nota Bene:

- Voorzie elk vel van uw naam, datum en studienummer
- Lees de vragen goed door alvorens te antwoorden.
- Niet elke vraag telt even zwaar.
- Schrijf a.u.b. duidelijk.
- Beantwoord de vragen liefst in het Engels. Antwoorden in het Nederlands zijn toegestaan.
- *In verband met het corrigeren van de antwoorden door twee docenten wordt u verzocht de antwoorden van Ores and Industrial Minerals en de antwoorden van Coal op verschillende vellen te schrijven.*
- U wordt verzocht de vragen weer in te leveren.

Questions on Ores, Industrial Minerals and Industrial Rocks

- 1) a) Describe the ore-forming-process called “Liquation”.
b) Which combination of ore-minerals would you expect in an ore formed by “Liquation”?
- 2) In the famous copper mines of Bor, Serbia, exploration went deeper and deeper as the meso- to epithermal copper ore with mainly *covellite* (CuS) became gradually exhausted. At greater depth also copper ore was discovered, however, with a lower ore grade. What type of ore do you think this was, and why?
- 3) Mention at least 3 applications of pure *quartz* (SiO_2).
- 4) Explain the difference and similarity between a sulfide and a sulfosalt.
- 5) Mention two applications of minerals from the *garnet group*. Give one example per application.

- 6) A certain class of ores is called SEDEX ores.
- What is the full name of this class of deposits?
 - What are the main ore minerals in such deposits?
 - Describe the formation of these ores.
 - Mention a famous example of these ores.
- 7) A composition of *olivine* ($Mg_2SiO_4 - Fe_2SiO_4$ solid solution) is used as an industrial mineral.
- Which composition is that, and why?
 - How is this mineral used?
- 8) From magnesium minerals like *magnesite* ($MgCO_3$), and *bischofite* ($MgCl_2 \cdot 6(H_2O)$), the white oxide MgO is produced via a pyrometallurgical process.
- Mention two important sources of bischofite. Give of each source an example.
 - Mention an important application of MgO .
- 9) Mention 4 very resistant minerals which you might expect to occur in a Dutch beach sand.
- 10) *Asbestos* is not used anymore because of health reasons. What is the main replacement of *asbestos*, and how is this produced?
- 11) Explain the meaning of the terms *Proven Ore*, *Probable Ore*, *Possible Ore*, and *Hypothetical Ore*.
- 12) In which structural group belongs the sulfide mineral *pentlandite* ($(Fe,Ni)_9S_8$)?
- 13) *Pyrite* and *marcasite* both have the composition FeS_2 . However, they have a different crystal structure.
- What is the name of this phenomenon?
 - This phenomenon also occurs with TiO_2 . What are the names of the minerals involved?

14) Explain why the adsorption of ions to the crystal structure of *goethite* (FeOOH) is so easy.

15) The *galena* type structure is analogous to what other type of structure?

Questions on Coal and Coal Deposits

N.B.: *Maak deze vragen op een apart vel. Vergeet uw naam en studienummer niet.*

16) During the *Carboniferous* a major part of the coal has been created.
Name two reasons why this period is so dominant in coal formation?

17) Name the four evolutionary stages of *raised swamps*.
Under which conditions can they evolve into large peat formations?

18) Name the three main *maceral groups* and the origin of their components.

19) Name 3 different types of *moisture* in a coal.

20) Describe in 5 sentences the production of *coke*.