

Tentamen Economic Minerals and Rocks TA3140

07 November 2011

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.
 - De vragen bij voorkeur in het *Engels* beantwoorden. Indien u liever in het *Nederlands* wilt antwoorden, is dat toegestaan.
 - U wordt verzocht de vragen weer in te leveren.
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Questions on Ores and Industrial Minerals

- 1) Explain as concise as possible the terms Grade, Cut-off Grade, Recovery. Which of these three is determined by the geology?
- 2)
 - a) Describe the ore-forming-process called “liquation”.
 - b) Would you expect to find massive ores or disseminated ores or both, and why?
 - c) Mention the three subgroups of ores formed by this process, and indicate which ore minerals you would expect to find in rocks of each subgroup.
 - d) Mention a famous example of each class given in question c).
 - e) Can ore complexes formed by liquation also contain ores formed by segregation? (I.e. can both processes occur simultaneously during ore formation?) Explain your answer.
- 3) Mention at least three processes that may cause crystallisation of hydrothermal fluids.
- 4) Describe the formation of rocks called skarns. Mention two chemical elements that are typical in these rocks. One of them is valuable, and forms deposits of economic value. Which element is this, and in what mineral does it usually occur?
- 5) What is “invisible gold”, and how does this form?
- 6)
 - a) What are VMS-deposits, and how do they form?
 - b) What metals are found in them?
- 7) What are the three minerals used for the production of magnesia (MgO)?
Mention two types of sources in which such minerals occur.
- 8) What requirements are demanded of quartz (SiO₂) to use it for glass manufacture?
Explain the reason for these requirements.

- 9) Very pure quartz (SiO_2) is used for the production of silicon. The reduce silica, coke is needed.
- What is the most severe requirement for the coke? Explain your answer.
 - Mention three uses of silicon metal. What is the most applied use?
- 10) a) Mention two important uses for high purity TiO_2 . What mineral structure has this high purity TiO_2 ?
- What other mineral structures can TiO_2 have?
 - Describe the chlorination process used to purify natural TiO_2 .

Questions on Crystallographic and Crystal Chemistry Aspects of Sulphides, Oxides and Hydroxides.

- 11) Sulphides are generally semiconductors. Explain this property.
- 12) Explain the difference and/or similarity between the sphalerite (ZnS) and wurtzite (ZnS) structure in the light of polytypes/polymorphs.
- 13) The structure of chalcopyrite (CuFeS_2) is a derivative of the structure of one of the ZnS -minerals mentioned in questions 12). Which one is that, and describe the derivation of the chalcopyrite structure.
- 14) Mention a typical chemical property of goethite (FeOOH), and explain why this occurs.
- 15) Oxide minerals have ionic bonds. Mention two common properties of oxide minerals that are directly related to this.

Questions on Coal and Coal deposits

- 16) Five aspects improve the preservation of organic matter. Name three aspects.
- 17) Coking coal is a process of carbonization. Describe the process.
- 18) Name the five stages of coalification and associated coal type.
- 19) Name a low and high caloric coal.
- 20) Name 3 different types of moisture in a coal.