

NDSU Mineralogy Exam 3 **sample questions** - 2001

Topics to be covered this exam include: oxides, hydroxides, halides, the -ates, nesosilicates, sorosilicates, cyclosilicates, substitution in minerals, analytical methods in mineralogy, mineral analysis recalculation, and plotting/phase diagrams of minerals.

Examples of types of questions follow. Make up some of your own as practice!

1. Someone from the local rock club brings you a heavy light gray mineral. You perform an XRF analysis and determine it has the following chemistry: (no calculations necessary, just answer by inspection)

	wt%
SrO	60.17
CaO	7.26
BaO	0.31
PbO	0.55
CO ₂	31.33

Based on its composition, this mineral would appear to be an impure specimen of (formula, name) _____, having in solid solution some of the following minerals: _____.

2. Write balanced reactions for the following situations:
- Metamorphism of an impure siliceous limestone:
calcite + quartz + hematite \rightarrow andradite + fluid
 - the weathering of olivine:
forsterite + water + quartz \rightarrow serpentine
[note: the formula for serpentine is Mg₃Si₂O₅(OH)₄]
 - alternatively, one could write the reaction:
forsterite + water \rightarrow serpentine + brucite
3. Draw two binary diagrams for the system FeO - SiO₂, one using a weight % scale and the other using molecular %. Plot fayalite on each. MW FeO = 71.85 and MW SiO₂ = 60.08
4. Driving across the plains one summer, you find a very salty lake that is in the last stages of drying up due to evaporation. What are **two** halides, **one** sulfate, and **two** carbonates (names and formulae) that you might expect to find around the edges of the remaining water?
5. What is the difference between:
- an electron microprobe and an XRF?
 - the AAS and ICP-AES methods?
6. Study the phase diagram of calcite-siderite-magnesite (Fig. 10.5 in your text). Be aware of the phase relations.