

Ex/SC/GEOL/UG/CORE/TH/03/2022

B. SC. (GEOLOGICAL SCIENCES) EXAMINATION, 2022

(1st Year, 2nd Semester)

ELEMENTS OF GEOCHEMISTRY

PAPER – CORE/TH/03

Time : Two hours

Full Marks : 40

(Use a separate Answer script for each Part)

PART – I

Answer *all* questions.

All questions carry equal marks.

1. An aqueous solution has 0.02 M CaCl_2 and 0.05M NaCl . What is the Ionic Strength of the solution? What is the relation of the Ionic Strength of a solution with the solubility of a solid?
2. Two containers, A and B, have boiling water inside and the pressure is one atmosphere. Temperature of water of A is more than the temperature of water in B. Water in one of the containers have dissolved CaCl_2 and the other has dissolved KCl . Identify the container that has CaCl_2 dissolved in water. Justify your answer. Can the temperature of water in any of the containers be 100°C ? Justify.
3. Why do some of the volcanoes show violent eruptions? State the law that explains this phenomenon.

[Turn over

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4. What is partition coefficient of a trace element in a mineral in a magmatic system? “In the variation diagram of a differentiated magmatic suite, Ni shows steep decrease as the differentiation proceeds.” Accept or reject the statement with reason.

PART – II

Answer *any four* questions. 4×5=20

1. What do you understand by “lanthanide contraction”? “Yttrium is geochemically similar to the heavy rare earth elements” – accept or reject the statement with reasons? Under what condition do Eu and Ce behave differently from other REEs and why? 1+2+2
2. “Elements with very high and very low ionic potential are more important as nutrients than elements with intermediate ionic potential” – accept or reject the statement with reason. “Uranium and chromium are potentially hazardous in oxidizing environment but less hazardous in reducing environments” – explain why. 3+2
3. “H₂S, derived from bacterial reduction of seawater SO₄²⁻ is characterized by much lower δ³⁴S values than seawater” – accept or reject the statement with reason. “The δ¹⁸O value of seawater will be heavier in interglacial period than the glacial period” – accept or reject the statement with reason. 2+3

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4. What do you understand by isochron method of dating? For a suite of co-genetic igneous rocks the initial ⁸⁷Sr/⁸⁶Sr ratios are same whereas the ⁸⁷Rb/⁸⁶Sr ratios are different – why? 2+3
5. What are the principal classes of meteorites? What are the fundamental differences in composition between the solar photosphere and CI carbonaceous chondrite and why? “Carbonaceous chondrites are extremely important for earth and planetary science research” – justify the statement. 1+2+2
6. Write short notes on a) Slow neutron capture (S-process) and Rapid neutron capture (R-process) process, b) Alpha and triple alpha processes of nucleosynthesis. 2½+2½