

2007 - 2008
 M.Sc. (IV SEMESTER) EXAMINATION
 APPLIED GEOLOGY
 GEOCHEMISTRY - II
 GLM - X001
 Maximum Marks: 35
 Duration: Two Hours

Answer all the questions.

- Briefly discuss the role of radiogenic isotopes in identifying the various geochemical reservoirs in the Earth's mantle. (9)
- OR
- Briefly discuss the use of oxygen and hydrogen isotopes as tracers of the hydrologic cycle.
- Write short note on the Carbon isotopic characteristics of marine and non-marine carbonates. (9)
- OR
- Write short note on the fractionation of Nitrogen isotopes and its use in characterizing the various igneous rocks.
- Write short notes on the following: (9)
 - Gibb's Free Energy
 - The Phase rule in thermodynamics
 - Partition / distribution coefficient of trace element.
- Discuss the concept of geochemical-biogeochemical cycling. How do these affect the global climate? (8)

$$\delta C^{13} = \frac{(C^{13}/C^{12})_{\text{sample}} - (C^{13}/C^{12})_{\text{std}}}{(C^{13}/C^{12})_{\text{std}}} \times 1000$$

Carbon in Biomatter & Seawater

(Fractionation during photosynthesis) & many plants
 Synthesize the C fixed in all forms is
 derived from CO₂ relative to atm CO₂.

Organic matter in recent sediments has

→ δC¹³ - varies ranging -10 - 13 ‰ wt
 maximum -20 - 27 ‰

→ δC¹³ from clays land based -21 to -26 ‰
 = 10-11 ‰

-21 - -26 ‰
 δC¹³ (PDB) - 25 ‰

C² - in druse carbon
 e¹⁵ - in residue



S ³²	95.02	(e ¹³)
S ³³	0.75	95.02
S ³⁴	4.21	0.75
S ³⁶	0.02	4.21
		0.02
		100.00

S³² = 95.02
 S³³ = 0.75
 S³⁴ = 4.21
 S³⁶ = 0.02

Anaerobic bacteria in sea

2 S³⁴ sulfate an atom H₂S
 very pure S³²
 in coal. Sulfate

→ Isotopic partitioning, volume
 S.M.