PRIFYSGOL ABERYSTWYTH UNIVERSITY

Fold over and stick down with label provided

Surname……..

Forename……

Student Reference No. .....

**SEMESTER 2 EXAMINATIONS 2026**

DEPARTMENT OF GEOGRAPHY & EARTH SCIENCES

# GS22720

# FUNDAMENTALS OF GEOCHEMISTRY

Time allowed : **2 HOURS**

Answer ALL questions.

Marks for each question are given in square brackets (e.g. [3]).

**HANDOUT OF THE PERIODIC TABLE IS PERMITTED**

**CALCULATORS ARE PERMITTED**

STUDENTS MAY SUBMIT ANSWERS TO THIS PAPER IN EITHER WELSH OR ENGLISH

**Once seated, students may complete the front cover of the answer book and the attendance slip ONLY.**

**DO NOT TURN THE EXAMINATION QUESTION PAPER ONTO THE NEXT PAGE UNTIL INSTRUCTED TO DO SO.**

**DO NOT WRITE IN THIS AREA**

1. Which elements were formed during ‘Big Bang’ nucleosynthesis? [4]

2. Describe the difference between nucleosynthesis slow (S)-processes vs. Rapid (R)-processes. [8]

3. When a star the size of our sun has used up all the hydrogen (H) in its core, what is the next stage of the star's evolution? [6]

4. Explain what a supernova event is and explain the mechanisms of nucleosynthesis that occurs. [10]

5. Draw an annotated diagram summarising the modern classification of meteorites, including subgroups.

[10]

6. Iron meteorites have a distinctive structure that can help determine the size of the parent body. Name and describe this structure and explain this statement. [7]

*Continued overleaf/*

7. What evidence links carbonaceous chondrites to the solar nebula? [4]

8. The age of the Earth is 4568.67 ± 0.17 Ma. Explain how the study of meteorites has been critical for the determination of this age. [6]

9. V M Goldschmidt, who is considered the father of geochemistry, classified the elements into 4 main groups. In the table below name 4 groups, highlight elements within each group, and describe each group based upon their geochemical and geological behaviour. [12]

| Group Name | | | | |
|---|---|---|---|---|
| Key elements in the group | | | | |
| Description of group | | | | |

10. With consideration of the periodic table, and the periodic groups, explain how the size of ions (the ionic radius) and their charge varies. [6]

11. Reproduce the PREM (Preliminary Reference Earth Model), with annotations of the properties of each layer presented. [7]

12. Draw a diagram of the physical and chemical boundaries present in the mantle, with annotations explaining the properties of each. [8]

13. Name the two ways in which the core varies in time and space. [2]

14. Define equilibrium and fractional crystallisation, and the differences between these processes, including which one commonly occurs in the mantle. [10]

15. CHONS were identified as the most suitable elements for early stable isotope work. State the five common properties which made this so. [5]

**END OF PAPER**