

- 一、簡答題：下列是摘自礦物學課本對 *Celestite* 礦物之描述性資料，請在詳細閱讀後按照題號簡單且完整的回答本題的 10 個小題。(注意：照抄英文得零分)【共 20 分】

**Celestite—SrSO<sub>4</sub>**

**Crystallography.** Orthorhombic;  $2/m2/m2/m$ . Crystals closely resemble those of barite. Commonly tabular parallel to {001} or prismatic parallel to  $a$  or  $b$  with prominent development of { $0kl$ } and { $h0l$ } prisms. Crystals elongated parallel to  $a$  are frequently terminated by nearly equal development of faces of  $d\{101\}$  and  $m\{210\}$  (Fig.1). Also radiating fibrous; granular.

$Pnma$ ;  $a = 8.38, b = 5.37, c = 6.85 \text{ \AA}$ ;  $Z = 4$ .  $d_s: 3.30(10), 3.18(6), 2.97(10), 2.73(6), 2.04(6)$ .

**Physical Properties.** Cleavage {001} perfect, {210} good.  $H 3-3\frac{1}{2}$ .  $G 3.95-3.97$ . Luster vitreous to pearly. Color colorless, white, often faintly blue or red. Transparent to translucent. Optics: (+);  $\alpha = 1.622, \beta = 1.624, \gamma = 1.631; 2V = 50^\circ; X = c, Y = b$ .

**Composition and Structure.** SrO 56.4, SO<sub>3</sub> 43.6% for pure celestite. Ba substitutes for Sr and a complete solid solution series exists between celestite and barite. At ordinary temperatures only a limited series exists between anhydrite, CaSO<sub>4</sub>, and SrSO<sub>4</sub>. Celestite is isostructural with barite (see Fig. 10.8).

**Diagnostic Features.** Closely resembles barite but is differentiated by lower specific gravity and by chemical test for strontium.

**Occurrence.** Celestite is found usually disseminated through limestone or sandstone, or in nests and lining cavities in such rocks. Associated with calcite, dolomite, gypsum, halite, sulfur, fluorite. Also found as a gangue mineral in lead veins.

Notable localities for its occurrence are with the sulfur deposits of Silicy; and Yate, Gloucestershire, England. Found in the United States at Clay Center, Ohio, and elsewhere in northwestern and southeastern Michigan; Lampasas, Texas; and with colemanite in Inyo County, California.

**Use.** Used in the preparation of strontium nitrate for fireworks and tracer bullets, and other strontium salts used in the refining of beet sugar.

**Name.** Derived from the Latin *caelestis* meaning heavenly, in allusion to the faint blue color of the first specimens described.

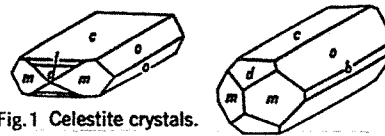
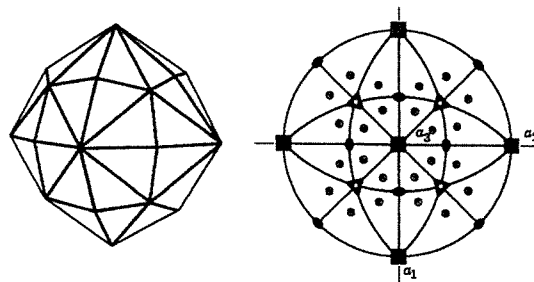


Fig.1 Celestite crystals.

1. *Celestite* 的中文礦物名稱是什麼？*Celestite* 是因為什麼而得名？
2. *Celestite* 與哪一種常見礦物最類似(請寫中文名稱)？要怎麼分辨？
3. *Celestite* 的結晶構造屬於哪一個晶族？哪一個空間群？
4. *Celestite* 通常是什麼顏色？有什麼用途？
5. *Celestite* 具有什麼解理？硬度是多少？
6. *Celestite* 的比重是多少？以中文來說是什麼光澤？
7. *Celestite* 的結晶構造(晶胞)中，最長的軸是哪個軸？一個晶胞中有多少個原子？
8. *Celestite* 晶體上常見的  $d$  與  $m$  兩個晶型的米勒係數各是什麼？(注意包括括弧的符號都要正確)
9. *Celestite* 的光學性質具有幾個光軸？最高雙折射值為多少？
10. *Celestite* 通常產於哪兩種岩石中？

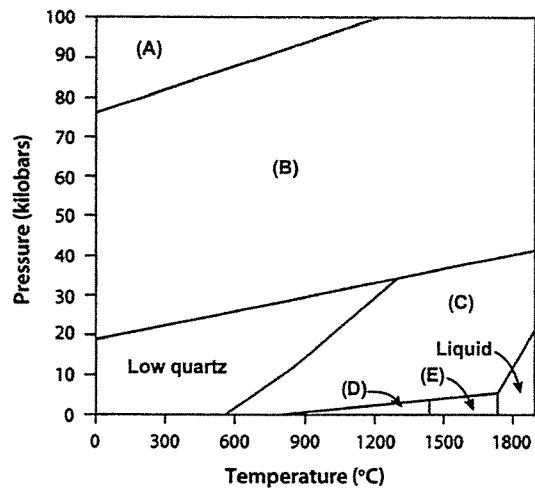
- 二、右圖是一個礦物晶體，最右圖則是其赤平投影。請問此晶體：

- (1) 有幾個晶面？
- (2) 屬於哪一個晶系？
- (3) 哪一個晶族？
- (4) 有幾個對稱面？
- (5) 有幾個兩次旋轉對稱軸？【10分】



見背面

- 三、右圖是成分為  $\text{SiO}_2$  的相圖。
- (1) 已知其中 Low quartz 與 Liquid 的位置，請問其他五個相 (High quartz, Cristobalite, Coesite, Stishovite, Tridymite) 各對應到圖中 (A) 至 (E) 的哪個位置？
- (2) 根據相律 (phase rule, 即  $P+F=C+2$ , 其中  $P$  為相,  $F$  為自由度,  $C$  為成分), 簡單計算並解釋此  $\text{SiO}_2$  系統中, 最多只會有幾相共存?
- 【10分】



- 四、解釋名詞: 【每題 5 分, 共 10 分】

- (1) Minerals
- (2) Feldspar

- 五、何謂岩漿及其形成機制和與板塊地體構造的關係。【15分】

- 六、何謂變質相? 詳細討論台灣變質岩相的分布和利用 P-T-t 來闡述台灣造山帶的抬升史。【15分】

- 七、解釋名詞: 【每題 5 分, 20 分】

- (1) Mg number (Mg#)
- (2) Arenite
- (3) Terrigenous sediments
- (4) Migmatite

試題隨卷繳回