

คณะวิศวกรรมศาสตร์  
มหาวิทยาลัยสงขลานครินทร์

การสอบกลางภาคการศึกษาที่ 1  
วันอาทิตย์ที่ 5 สิงหาคม 2550  
วิชา : 235-320 : Mineral Processing I

ปีการศึกษา 2550  
เวลา : 9.00-12.00 น.  
ห้อง : A 303

คำชี้แจง

1. ข้อสอบมีทั้งหมด 8 ข้อ ให้ทำในกระดาษคำตอบนี้ คะแนนทั้งหมดคิดเป็น 30 %
2. ห้ามนำเอกสารหรือตำราเข้าห้องสอบ
3. นำเครื่องคิดเลขเข้าห้องสอบได้

ทุกจุดในการสอบโทษขั้นต่ำ คือ ปรับตกในรายวิชาที่ทุจริต และพักการเรียน 1 ภาคการศึกษา

ชื่อ \_\_\_\_\_ รหัส \_\_\_\_\_

สูตรที่มีประโยชน์

1.  $S.E. = R_m - R_g, R_m = 100 Cc/Ff, R_g = 100 C(m-c)/(m-f)$
2.  $\% \text{ solids, } x = 100 S (D - 1000) / D (S - 1000)$
3.  $M = FDx$
4.  $\text{dilution ratio} = (100 - x) / x$

ข้อ	คะแนนเต็ม	คะแนนที่ได้
1	10	
2	5	
3	5	
4	10	
5	5	
6	15	
7	20	
8	20	
รวม	90	

รศ.ดร.เล็ก สีคง

รหัส.....

1. (10 marks/.....) Explain;

1.1 Separation efficiency

1.2 Enrichment ratio

1.3 Ratio of concentration

1.4 Recovery

1.5 Economic efficiency

1.6 Net smelter return (NSR)

1.7 Assay

1.8 Flowchart

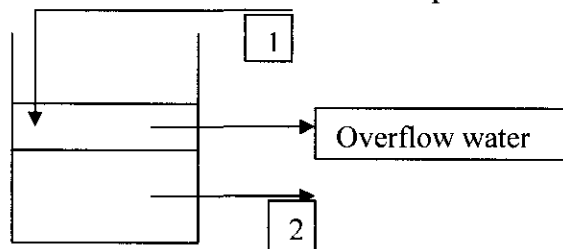
1.9 Circulating load ratio

1.10 Flocculation



รหัส.....

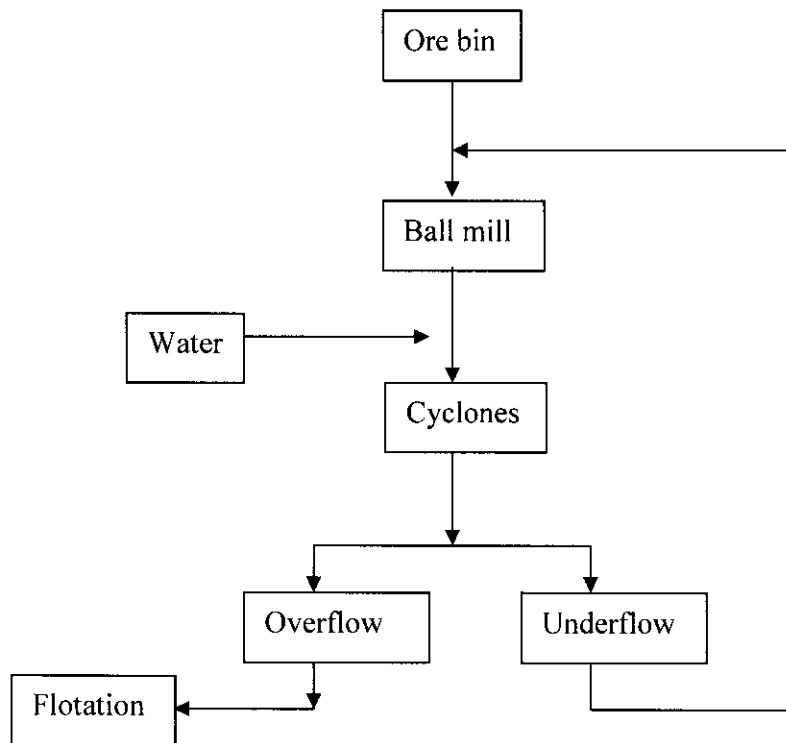
4. (10 marks/.....) Slurry stream 1 containing fluorite mineral (density =  $3000 \text{ kg/m}^3$ ) flows into a sump with the pulp density of  $1500 \text{ kg/m}^3$  and the flow rate of  $1.0 \text{ m}^3/\text{h}$ . Stream 2 having a density of  $1800 \text{ kg/m}^3$  is pumped from the sump to the flotation plant. Calculate % solids by weight of both streams, the mass flow rate of dry solid in stream 1, the volumetric flow rate of slurry in stream 2 and the flow rate of the overflow water from a sump.



5. (5 marks/.....) In fluorite flotation plant, feed, concentrate and tailing contain 50, 90 and 0.1%  $\text{CaF}_2$  respectively.
- 5.1 Calculate amount of concentrate if feed rate is  $100 \text{ t/h}$
- 5.2 Estimate % recovery, enrichment ratio and ratio of concentration

รหัส.....

6. (15 marks/.....) From the figure below, the mass of dry ore fed to flotation is 40 ton/h. The ball mill feed from ore bin contains 5 % moisture. The cyclone feed, underflow and overflow contain 35, 60, and 20% solids. Calculate the circulating load ratio on the circuit and the amount of water required to dilute the ball mill discharge.



รหัส.....

7. (20 marks/.....) A mineral processing plant treats 300 tons of material during shift assaying 3 %Sn to produce a concentrate and tailing grades of 60%Sn and 0.1 % Sn respectively. Find the tonnage of concentrate and complete the metallurgical balance for shift 1 in table 1. Suppose that on the next shift 200 tons of 2.5% Sn material is treated to produce a concentrate and tailing grades of 70%Sn and 0.12%Sn respectively. Complete the metallurgical balance for this shift in table 2, combine shift 1 and 2 and estimate the theoretical and actual recoveries if 20.5 tons of the concentrate is weighed during 2 shifts.

รหัส.....

Table 1 Shift 1 performance

Item	Weight, t	Assay, %Sn	Weight of tin, t	Distribution of Sn, %
Feed	300	3		
Conc.		60		
Tail		0.1		

Table 2 Shift 2 performance

Item	Weight, t	Assay, %Sn	Weight of tin, t	Distribution of Sn, %
Feed	200	2.5		
Conc.		70		
Tail		0.12		

Table 3 Combination of shift 1 and 2 performance

Item	Weight, t	Assay, %Sn	Weight of tin, t	Distribution of Sn, %
Feed				
Conc.				
Loss				
Tail				

8. (20 marks/.....) Ores were treated by mineral processing pilot plant and the following assay data was collected:

Feed: 0.5 % Sn, 1.0 % Pb, 1.50 % Zn  
 Sn concentrate: 45 % Sn, 0.5 % Pb, 3.40 % Zn  
 (Sn Recovery 80 %)  
 Pb concentrate: 0.05 % Sn, 60 % Pb, 3.00 % Zn  
 (Pb Recovery 90 %)  
 Zn concentrate: 0.01 % Sn, 1.5 % Pb, 50 % Zn  
 (Zn Recovery 70% )

รหัส.....

8.1 Calculate the overall economic efficiency under the following simplified smelter terms

- Cassiterite: Tin price: 200,000 Baht/ton  
Smelter payment 99% of tin content  
Smelter treatment charge: 400 Baht/ton conc.  
Transport cost: 300 Baht/ton conc.
- Galena: Lead price: 15,000 Baht/ton  
Smelter payment: 90% of Pb content  
Smelter treatment charge: 450 Baht/ton conc.  
Transport cost: 300 Baht/ton conc.
- Sphalerite: Zinc price: 30,000 Baht/ton  
Smelter payment 85% of tin content  
Smelter treatment charge: 500 Baht/ton conc.  
Transport cost: 300 Baht/ton conc.



รหัส.....

8.2 If the mining and other cost are 220 Baht/ton and milling cost is 140 Baht/ton, calculate the profit and overall effective cost.

Good Luck!