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UG/2nd Sem/Geolo/H/19 (Pr.)

2019

B.Sc.

2nd Semester Examination

**GEOLOGY (Honours)**

Paper - C3P

(Elements of Geochemistry)

[Practical]

Full Marks : 20

Time : 3 Hours

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers  
in their own words as far as practicable.*

Answer all questions.

1. Table 1 lists the chemical analyses for a group of volcanic rocks that apparently crystallised from a single magma. Careful petrographic work suggests that these rocks do represent liquid compositions. These data will be used for all the following questions :

**Table 1 : Chemical analysis for a suite of related volcanic rocks.**

wt%	1	2	3	4	5	6	7	8	9	10
SiO <sub>2</sub>	45.51	47.36	48.35	49.00	50.09	52.45	56.17	56.87	61.01	61.22
TiO <sub>2</sub>	3.52	3.30	2.82	2.73	2.48	2.29	1.61	1.40	0.68	1.00
Al <sub>2</sub> O <sub>3</sub>	15.24	16.32	16.01	16.33	16.83	16.09	17.13	16.96	17.14	17.10
Fe <sub>2</sub> O <sub>3</sub>	3.64	4.64	5.87	2.35	1.65	5.02	2.91	3.88	5.09	2.03
FeO	8.84	6.89	5.37	8.67	8.80	4.19	4.79	3.93	1.21	4.06
Fe <sub>2</sub> O <sub>3t</sub>										
MgO	5.80	4.82	4.30	4.00	3.31	2.67	1.73	1.57	0.76	0.92
CaO	10.40	9.30	9.04	8.70	8.50	7.49	5.20	4.83	3.33	3.28
Na <sub>2</sub> O	4.54	4.63	5.32	4.98	5.31	6.11	6.33	6.47	7.07	6.61
K <sub>2</sub> O	1.09	1.49	1.14	1.66	1.39	1.64	2.22	2.43	2.87	3.05
P <sub>2</sub> O <sub>5</sub>	0.20	0.38	0.46	0.54	0.63	0.68	0.73	0.80	0.94	1.00
Norm										
(%)										
Q	0	0	0	0	0	0	0	0.6	4.1	4.0
or	6.5	8.9	6.8	9.9	8.3	9.8	13.3	14.5	16.9	18.0
Ab	18.3	26.6	33.3	29.0	33.7	45.9	54.2	55.2	59.8	55.8
Ne	11.1	7.0	6.7	7.4	6.3	3.5	0	0	0	0

(a) Plot Na<sub>2</sub>O+K<sub>2</sub>O and CaO vs SiO<sub>2</sub>. Draw best-fit straight lines through the two sets of data points. What SiO<sub>2</sub> concentration do these two trends cross? What is the Peacock alkali-lime index for this group of rocks?

(b) Plot MgO and total iron as FeO<sub>t</sub> (Fe<sub>2</sub>O<sub>3</sub> + FeO/0.9) vs SiO<sub>2</sub>. Draw smooth curves through the data points. From the plots of Na<sub>2</sub>O+K<sub>2</sub>O, CaO, MgO and FeO<sub>t</sub>

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vs  $\text{SiO}_2$ , what can you conclude about the magmatic evolution of this group of rocks ?

- (c) Calculate the mg# for the various samples.
- (d) Plot you data on an AFM diagram. In the resulting trend tholeiitic or calc-alkaline ?

5+5+2+3

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|-------------------------|---|
| 2. Laboratory notebook. | 2 |
| 3. Viva-voce.           | 3 |
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