



Instructions: Answer all questions. All symbols carry their usual meaning.

1. (4 marks) In the Orsat analysis experiment various materials are used for absorption of various gases. Discuss the chemical nature of each of the materials used for absorption of each of the gases.
2. (4 marks) Sketch a Redwood viscometer. How does the kinematic viscosity varies with temperature? What is the unit of kinematic viscosity?
3. (4 marks) What are the differences between flash point, fire point and auto ignition point? What are the main factors that determine the flash point of a fuel?
4. (4 marks) What is the unit of caking index? What is the typical range of caking index for bituminous coal?
5. (4 marks) What are the main components of coal? What is the pore size (in mm) for 72 mesh BS sieve? Explain the experimental procedure (with scientific logic) for determination of volatile matter of coal.
6. (4 marks) What is "gum" in a gasoline sample? What is the chemical nature of it?
7. (4 marks) Arrange the smoke point (in ascending order) for the following samples: gasoline, diesel, kerosene, vegetable oil, lubricating oil.
8. (4 marks) Can we use the Reid vapour pressure instrument to obtain the "true" vapour pressure of a volatile liquid? Explain your answer.
9. (4 marks) What is destructive distillation of coal? What are the products of destructive distillation of coal? What is caking reaction and coking reaction?
10. (4 marks) What is the typical solubility of water in the oils (hydrocarbons)? What is the state in which most of the moisture present in an hydrocarbon? Which apparatus is used for determining the moisture content of an oil?

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