

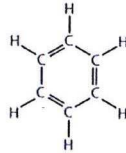
Petroleum Geology AES3820
Written Examination, November 7, 2014

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This is a **multiple choice test** that will be automatically evaluated using the programme SONATE. You have to fill in your name, exam name, date, course code and student number prior to answering the questions. This has to be done by filling in for every answer one of the rectangles (only one!), as shown on the sheet. For some questions there may be multiple answers with variable weightings, but you can still only fill in one! There are 45 questions in total. I wish you success!

1. How many litres does a barrel of oil contain? A: 75; B: 159; C: 195; D: 951
2. What is the average production of an oil well in the Middle East (in barrels, bbls)? A: 20 bbls; B: 1200 bbls; C: 7000 bbls; D: 40000 bbls
3. What is the total cumulative World oil consumption from 1860 to 2013 in billion barrels (Gbo)? A: 1208 Gbo; B: 1107 Gbo; C: 1372 Gbo; D: 2311 Gbo
4. Which International E&P Company has the largest equivalent oil production (boe, in 2013)? A: BP; B: Shell; C: Total; D: ExxonMobil
5. At current production levels, for how many years will the known oil reserves last (global R/P value)? A: 55; B: 35; C: 70; D: 121
6. What is the percentage of fossil energy consumption as a fraction of the total energy consumption worldwide? A: 90%; B: 85%; C: 75%; D: 80%
7. From the 1920s onward wells could be drilled to depths of 3000 meters. What made this possible? A: Improved seismic; B: New geologic insights into the oil depth window; C: Rotary drilling; D: All of these
8. What is zooplankton? A: Planktonic foraminifera; B: Planktonic foraminifera and crustaceans; C: Planktonic foraminifera, radiolaria and planktonic crustaceans; D: Planktonic foraminifera, radiolaria, planktonic crustaceans and jellyfish
9. In which country is the theory of the non-organic origin of petroleum most popular? A: Ukraine; B: Russia; C: United States; D: Kazakhstan
10. How many million years ago did the oxygen content of the atmosphere reach about current levels? A: 540; B: 750; C: 450; D: 320
11. What caused the oxygen level to increase to the level mentioned in 10? A: Photosynthesis of plants; B: Volcanic eruptions; C: Radioactive decay; D: All of these
12. What are the four groups of biomolecules in living matter? A: Proteins, lipids, carbohydrates and lignin; B: Proteins, lipids, carbohydrates and enzymes; C: Proteins, lipids, carbohydrates and lignin; D: Proteins, olefins, lipids, carbohydrates
13. Why are lipids considered to be the main source of petroleum? A: Because their carbon content is similar; B: Because their hydrogen content is similar; C: Because both are low in nitrogen and sulfur; D: All of these
14. Which conditions are needed for organic matter to get buried as part of the sediments? A: Open ocean conditions and low wave energy; B: Nutrient-rich shallow water with anoxic deeper water; C: Tropical seas with no water circulation; D: Cold iron-rich water with clay sediments

15. What is the percentage of organic matter in the subsurface that has been converted into petroleum and has migrated into a reservoir? A: 10%; B: 1%; C: 0.1%; **D: 0.01%**
16. What is a major argument for the organic origin of petroleum? **A: The correlation of TOC with OM;** B: The presence of oil seepages at the surface; C: Lopatin's Index; D: Small remains of phytoplankton found in petroleum
17. Which elemental changes occur during the maturation process of organic matter? A: Denitrogenization and deoxydation; B: Deoxydation and desulfurisation; **C: Dehydrogenisation and carbonisation;** D: All of these.
18. Which kerogen types in the van Krevelen diagram are oil-prone? A: I and III; **B: I and II;** C: II and III; D: I, II and III
19. Which Vitrinite reflectance values delimit the oil window? **A: 0.5 and 1.3;** B: 0.3 and 1.5; C: 0.3 and 0.5; D: 1.3 and 1.5
20. At which typical depths lies the oil window? A: Between 2 and 6 km; B: Between 3 and 4 km; C: Between 4 and 6 km; **D: Between 2 and 4 km**
21. What is the by-product of petroleum cracking at high temperatures into methane? A: Pyrobitumen; B: Graphite; **C: Heavy oil;** D: All of these



22. What is the name of this molecule? Hexane A: Aromatic; B: Cyclohexane; **C: Benzene;** D:
23. What is butylene? **A: An olefin;** B: A naphthene; C: A camping gas; D: A paraffin
24. What is the distillation fraction between C11 and C13 called? A: Gasoline; **B: Kerosene;** C: Diesel fuel; D: Heavy gas oil
25. Which processes are used to increase the gasoline fraction in refineries? A: Cracking; B: Demercaptanisation; C: Polymerization; **D: A and C.**
26. Asphaltic residuum can be separated by solvents into oils, resins and asphaltenes. Which solvents are used to do this? A: Turpentine and benzene; B: Spiritus and n-pentane; C: n-pentane and liquid propane; **D: Liquid propane and soap**
27. What is the percentage of hydrocarbons that is used as fuels? A: 87%; B: 97%; **C: 93%;** D: 65%
28. What is the typical salt concentration in formation waters at 3 km depth? **A: 350,000 ppm;** B: 650,000 ppm; C: 30,000 ppm; D: 120,000 ppm
29. Why are oil seepages important? A: They prove that oil migration is still ongoing; **B: They prove that migration is a fact;** C: They helped Mesopotamians build pyramids; D: All of these
30. By how many porosity percent has an average shale decreased from the surface to a burial depth of 3 km? A: 45%; B: 35%; **C: 25%;** D: 55%
31. Which primary migration mechanism may be the most important one? A: Migration by molecular solution in water; B: Migration along microfractures; C: Migration by diffusion; **D: Oil-phase migration**
32. Can primary migration occur in a downward direction? A: Yes if the oil is heavier than the water; B: No; C: Yes, in the Southern hemisphere; **D: Yes if there is a downward pressure gradient**
33. In reservoir geology what is a seal? **A: An impervious layer topping a trap;** B: An animal that is clubbed to death for its fur; C: Anhydrites and salts; D: Shales

34. What is considered a "good" reservoir rock permeability? A: 1-10 mD; B: 10-100 mD; C: 100-1000 mD; D: above 1000 mD
35. What is the property in sandstones that affects permeability the most? A: Grain size; B: Grain sorting; C: Grain roundness; D: The amount of clay
36. What is secondary porosity? A: Porosity that is of secondary importance; B: Porosity created during secondary migration; C: Porosity created in the subsurface; D: Porosity created within seconds
37. What is the most important tool geologists use to build 3-D reservoir models from well data? A: Intuition; B: Analogues; C: Seismic; D: Petrel
38. Why are carbonates so different in reservoir behaviour from sandstones? A: They have more and different pore types; B: They have different mineralogies; C: They are deposited in a different environment; D: All of these
39. What is a combination trap? A: An anticlinal trap with faults; B: A fault trap around a salt dome; C: A trap that changed its characteristics through geologic time; D: A trap with structural and stratigraphic elements
40. What type of traps are most oil fields in Iran? A: Combination traps; B: Structural traps; C: Stratigraphic traps; D: Salt domes
41. What characterises a dynamic trap? A: Differential entrapment; B: A tilted oil-water contact; C: A trap that changes its style during production; D: A very subtle trap
42. What type of basin is the Central Graben in the North Sea? A: An epicratonic basin; B: A strike-slip basin; C: A rifted basin; D: An intracratonic basin
43. What type of basin is the Prudhoe Bay (North Slope) basin? A: A fore-arc basin; B: A back-arc basin; C: An epicratonic basin; D: A strike-slip basin
44. Why is seismic the preferred exploration technique? A: It is cheaper than other methods; B: It has a better resolution and coverage than other methods; C: It is easy to interpret; D: It is fast to process
45. What does the name petroleum mean? A: The precursor of petrol; B: Leaking stone; C: Rock oil; D: Nothing.

