

reaction is definite and unvaried, whereas petroleum varies in physical and chemical character. The chemist says this variation is due to impurities and the movement of oil in the rocks; yet the truth is, there is very little movement of oil in the rocks.

¶ The geologists, whose opinion is the one to follow, declare petroleum is of organic origin, due to the slow decomposition of organic remains, animal or vegetable, stored in rocks since their formation.

¶ What is the lesson obtained in this regard from the investigation of the California oil fields? There the oil is found in foraminiferal and diatomaceous shale, called Monterey shale. Under the lens of the microscope are seen small round dots, which are the siliceous skeletons of minute marine organisms, called diatoms, a low order of plants or algae, with power of multiplying at great speed, increasing 1,000,000 a month, and so closely packed as to form the bulk of the rock. These diatoms secrete algae wax or oil to the extent of 0.75% to 4% of their total volume.

¶ Yet every oil field has its own characteristics. The light colored oils of Russia are of vegetable origin. The differences are due to animal or plant remains, the degrees of heat to which the rock formation has been subjected, the time of decomposition, and the rock material itself.

¶ The character and the attitude of shale control the petroleum deposits.

¶ The valuable deposits so far discovered depend on (1) suitable conditions in the rocks and (2) adequate original sources of supply.

¶ The first requisite of an oil field is a coarse grained porous rock to act as a reservoir. This is usually sandstone. Hence "oil sands"; but sometimes it is limestone, pudding-stone or conglomerate. Further, this reservoir rock must be entirely covered by a fine grained non-porous layer, impervious and unbroken, if the reservoir is to retain the oil. Fine grained shale is the commonest and most perfect cover. A third factor may be folds in the strata - arches or troughs resulting from shrinking and wrinkling of the earth's crust. The deposit is found under the roofs of these arches or anticlines, because the oil is much lighter than the salt water occurring in the same strata, and therefore, it rises to the highest point possible under the arching, impervious shale cover. This is an especially favorable sign, but it is not essential.

¶ Rock containing petroleum may apparently be perfectly solid throughout; but, under the magnifying glass, millions of tiny spaces appear between the different sand grains, and water will find its way through thick pieces of the rock in a short time. About one-eighth of the bulk of the rock is petroleum.

¶ Oil usually exists under pressure because of the imprisoned natural gas always associated with petroleum.

¶ In 1911 the world's supply of oil was 400,000,000 barrels. The world supply of petroleum is absolutely limited by the quantity of fossil remains to undergo decomposition when imprisoned in the strata at the time of their formation; so that when this decomposition is once completed, it is finished for all time. These oil-bearing strata have existed for millions of years and the decomposition process completed years ago. The quantity accumulated in 10,000 years would be insignificant.

¶ Hence this important conclusion: The entire supply of petroleum procurable is now already stored underground waiting for the drill. It will not be added to. Every barrel taken away leaves so much less forever.

¶ The principal hope for the future discovery of new oil fields is from surface indications of petroleum.