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A Comparison of Chemical Geothermometers for Hot Springs in Western Turkey

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Abstract: Heat flow has critical role on Geothermal, Petroleum and Geodynamic studies. Despite its crucial importance, there is not enough data for evaluating heat flow. To calculate heat flow, temperature distributions and thermal conductivities are needed. Geothermometers can be used to estimate the temperatures by analyzing the chemical content of waters. Temperature logs are not available for every geothermal area. Using geothermometers we can obtain temperature values by economical and rapid way. Several geothermometers have been developed to predict the reservoir temperatures during the past four decades. All equations are based on the assumption that temperature dependent water-mineral equilibrium is prevailed in the reservoir In this study, geothermometer equations are applied to hydro-chemical data obtained from Inventory of Turkey Geothermal Resources, reported by Mineral Research & Exploration General Directorate (MTA) in 2005. These data sets consist of surface temperature, Na, K, Ca, Cl, Mg, Li contents of thermal water and their locations. Before calculating the reservoir temperatures, maturity index (MI) value is determined for every data set. The equations given in literature are used to calculate temperature values around western Turkey. Using geothermal gradient method Heat Flow values of study area is calculated by using a constant thermal conductivity values of k= 2.1 W/mK. According to our calculations heat flow and temperature values are high in Western Anatolia. The highest temperature value of about 250 Celcius degrees is obtained near Denizli. This area is also a part of seismically active region and known its geothermal resources.