



## Characterization of aviation turbine fuel with spindle oil

J.Balakrishnan<sup>1</sup>, S.Ekambaram<sup>2</sup>, SurajbhanSharma<sup>3</sup> and G. Ramachandran<sup>4</sup>

<sup>1,2</sup>Department of Chemistry, AMET University, Chennai, India-603112.

<sup>3</sup>Department of Management, AMET University, Chennai, India-603112.

<sup>4</sup>Department of Chemistry, Dr. Ambedkar Arts & Science College, India-600059.

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### ABSTRACT

Study has been conducted on Aviation Turbine Fuel with spindle oil and result was analysed based on different physical parameters like Density, Kinematic Viscosity and Aniline point. These parameters show a characteristic change in the behaviour of aviation turbine fuel, when mixed with spindle oil.

**Key Words:** Density, Kinematic Viscosity, Aniline point, Aviation turbine fuel, spindle oil

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### INTRODUCTION

A study on Aviation Turbine Fuel with spindle carried out based on physical parameters like Density, Kinematic Viscosity and Aniline point. Aviation turbine fuel is a petroleum fuel which highly aromatic in nature. Aviation Turbine Fuel is a liquid fraction of petroleum [1], which is used as fuel for air craft. Petroleum [2] is a mixture of hydro carbon [3] [hydrogen and carbon].Petroleum [4] is obtained from decay and decomposition [5] of plant and animal body The liquid fraction of petroleum [6], Aviation Turbine Fuel plays vital role in our day to day life in field like fuel for air transports [7].The aviation turbine fuel was obtained from oil Company [8], which is fractioned [9] from crude oil based on boiling point [10] and blended with spindle oil. The blend of Aviation turbine Fuel is prepared by volume percentage and the blend was analyzed, based on BIS method (IS 1448).

### EXPERIMENTAL SECTION

The Aviation Turbine Fuel and blended Aviation Turbine Fuel with Spindle oil have been analyzed for physical parameters. Physical parameter of Density, Kinematic Viscosity and aniline point are measured based on BIS method. The blend of Aviation Turbine Fuel is prepared as ATF 100%, ATF 90%, ATF 80%, ATF 70%, ATF 60%, ATF 50%, ATF 40%, ATF 30%, ATF 20%, ATF 10% and SO100%. ATF = Aviation Turbine Fuel, SO = Spindle oil

### RESULTS AND DISCUSSION

#### Density

Addition of spindle oil increases the density [12] of Aviation Turbine Fuel gradually is given in the table: 1 & shown in figure: 1. As the percentage of spindle oil increases, the density of Aviation Turbine Fuel increases, since the density of spindle oil (0.8674 g/ml) is greater than Aviation Turbine Fuel.

#### Kinematic Viscosity@40<sup>o</sup> C

Kinematic Viscosity [13] increases progressively with addition of spindle oil. The Kinematic viscosity of Spindle oil is greater the Aviation Turbine Fuel is given in the table: 1 & shown in figure: 2. With increase in Kinematic

Viscosity, the movement of fuel from tank to engine decreases since the Kinematic Viscosity is temperature dependent. At higher altitude the temperature becomes low, therefore the flow of fuel become gummy.

**Aniline point.**

The aniline point of Aviation Turbine Fuel decreases with increases spindle oil is given in the table: 1 & shown in the figure: 3. This is due to the fact that Aviation Turbine Fuel contains highly aromatic content and spindle oil is highly paraffinic content. When the paraffinic content is added to the Aviation Turbine Fuel the aromatic content decreases, is visually observed in the aniline point analysis. The aniline point character is useful tool for detection of whether the fuel is paraffinic or aromatic nature. When the air craft moves higher the altitude the paraffinic will (wax) solidify. Since the temperature becomes lower at higher altitude.

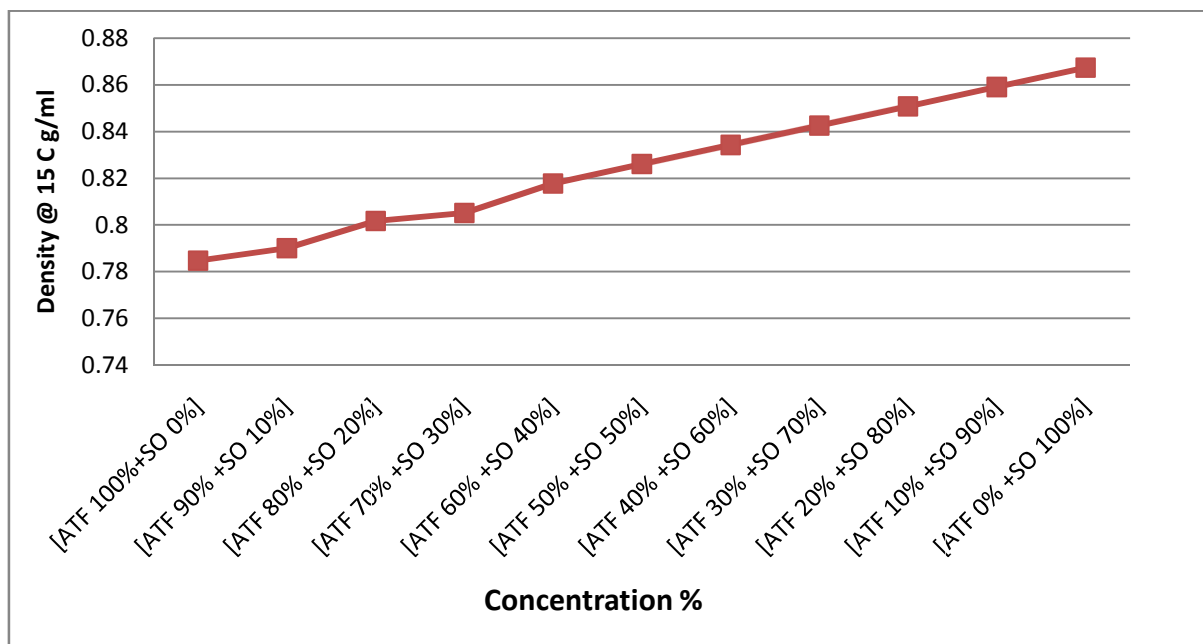


Figure:1 plot of Density Versus` Concentration

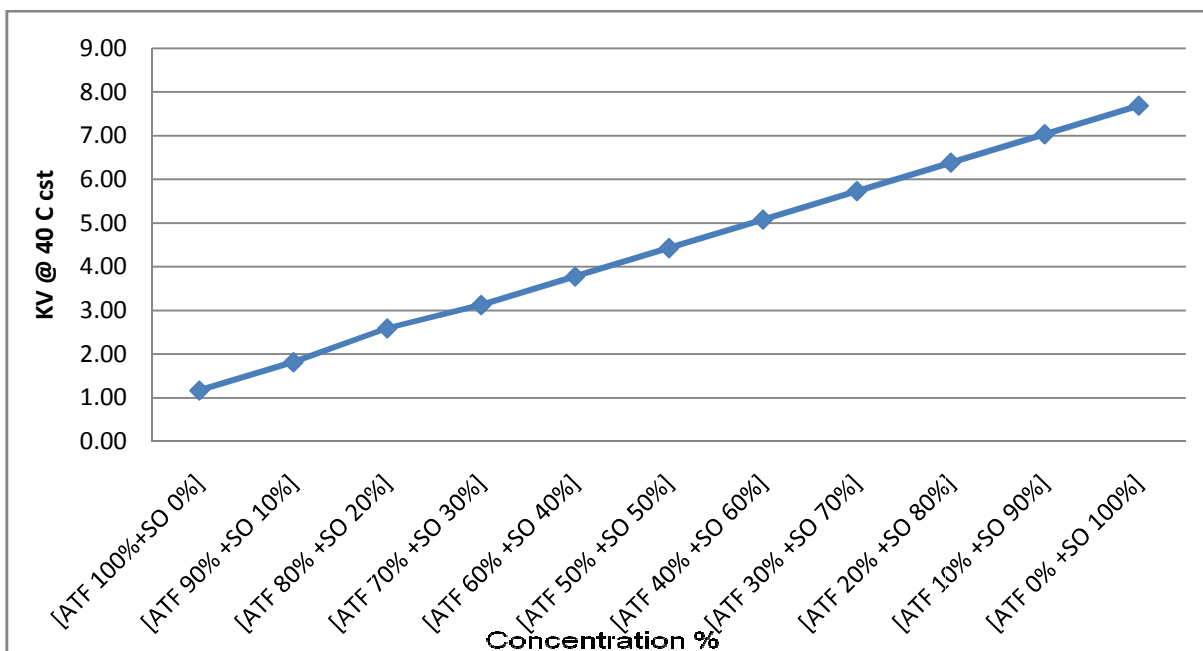


Figure: 2 plot of Kinematic Viscosity Versus Concentration

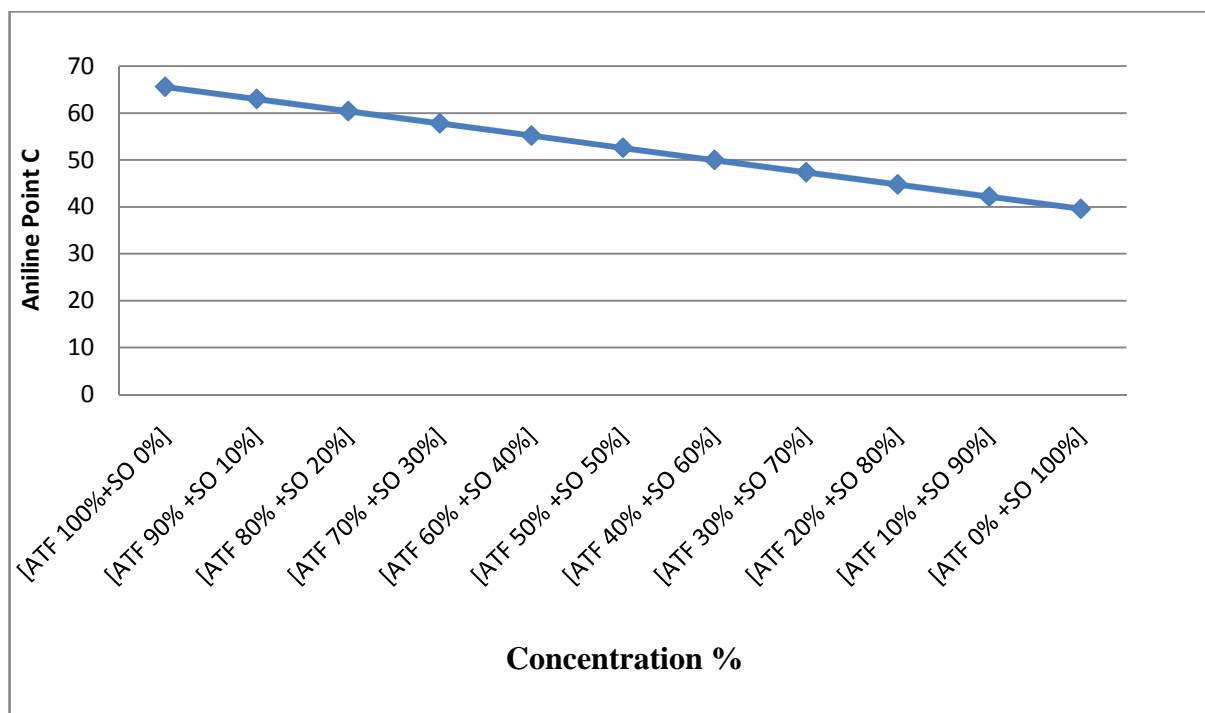


Figure: 3 plot of Aniline point Versus Concentration

Table :1

Test	ATF 100%+SO 0%	ATF 90%+SO 10%	ATF 80% +SO 20%	ATF 70% +SO 30%	ATF 60% +SO 40%	ATF 50% +SO 50%	ATF 40% +SO 60%	ATF 30% +SO 70%	ATF 20% +SO 80%	ATF 10% +SO 90%	ATF 0% +SO 100%
Density@15 C g/ml	0.7847	0.7900	0.8017	0.8051	0.8178	0.8261	0.8343	0.8426	0.8509	0.8591	0.8674
K-Viscosity @ 40 C cSt	1.17	1.81	2.59	3.13	3.78	4.43	5.08	5.73	6.39	7.04	7.69
Aniline Point C	65.6	63	60.4	57.8	55.2	52.6	50	47.4	44.8	42.2	39.6

### CONCLUSION

With the addition of spindle oil to aviation turbine fuel the fuel will be normal at the ground level, but when the air craft move to higher level the fuel will solidify and movement of fuel from tank to engine will stop, because of wax formation. Therefore air craft will cause mishap.

### Acknowledgment

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