

## Synthesis and properties of iron, aluminium and yttrium vanadates

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An aqueous solution containing stoichiometric amounts of metal (Fe, Al and Y) nitrate, ammonium meta vanadate, ammonium nitrate and 3-methyl pyrazole-5-one when heated rapidly at 350°C boils and ignites to yield amorphous metal vanadates in less than 5 min. The products when heated at 650°C for 1 h gave crystalline single phase,  $MVO_4$ , where M = Fe, Al and Y. Lattice parameters  $FeVO_4$ :  $a = 8.0572(19)$ ,  $b = 9.347(2)$ ,  $c = 6.7138(13)$ ,  $\alpha = 106.6$ ,  $\beta = 101.53$ ,  $\gamma = 96.7$ ;  $AlVO_4$ :  $a = 6.471(1)$ ,  $b = 7.742(1)$ ,  $c = 9.084(1)$ ,  $\alpha = 96.8$ ,  $\beta = 105.8$ ,  $\gamma = 101.4$ ; and  $YVO_4$ :  $a = b = 7.1192$ ,  $c = 6.2898$ ,  $\alpha = \beta = \gamma = 90$  agree well with the literature. Surface area of the vanadates are:  $FeVO_4$ -2 m<sup>2</sup>/g,  $AlVO_4$ -7 m<sup>2</sup>/g and  $YVO_4$ -14 m<sup>2</sup>/g. Average agglomerate size determined by sedimentation technique are 4.59  $\mu$ m ( $FeVO_4$ ), 4.82  $\mu$ m ( $AlVO_4$ ) and 3.13  $\mu$ m ( $YVO_4$ ). Room temperature fluorescence of  $Eu^{3+}$  doped  $YVO_4$  shows three bands at 611, 615 and 619 nm due to  $^5D_0 \rightarrow ^7F_2$  transitions and emission at 595 nm due to  $^5D_0 \rightarrow ^7F_1$  transition.

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