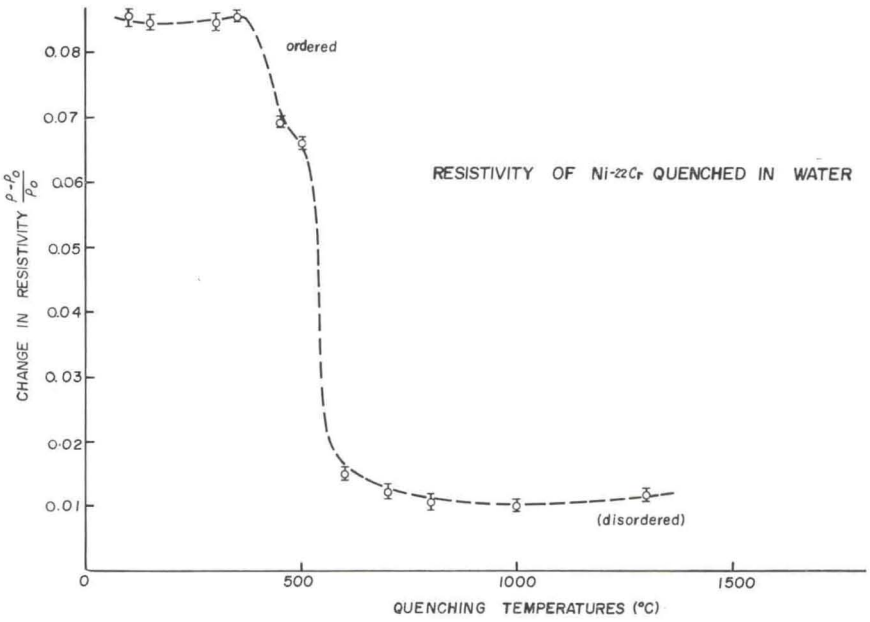
§ 3. Experimental Results

3.1. *Results of the Pre-Shock Quenching and Isothermal Annealing Experiments*

By isothermal annealing, and by variation of peak quench temperature, the effect of quench temperature on the degree of order and on the ordering rate was determined. In the furnace cooled state (furnace cooled from 1250°C), Ni–22 Cr had a room temperature resistivity of 110·2 $\mu\Omega$-cm, while the Ni–30 Cr alloy had a resistivity of 111·5 $\mu\Omega$-cm. The resistivity in the initial quenched state (quenched from 1250°C) was 102·3 $\mu\Omega$-cm for Ni-22 Cr and 103 $\mu\Omega$-cm for Ni–30 Cr. Figure 1 shows the effect of quench temperature on resistivity for the Ni–22 Cr alloy. It is noted that a 7 % drop in resistivity occurs at approximately 500°C. This drop in resistivity was found at a temperature close to the critical temperature of 544°C obtained by Taylor and Hinton (1952).

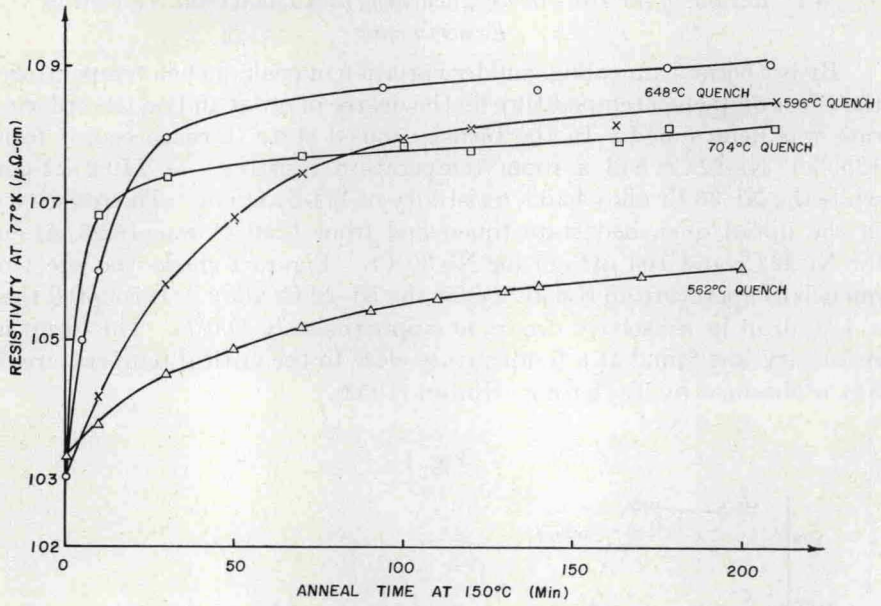
Fig. 1



Effect of quenching temperature on the resistivity of Ni–22 Cr.

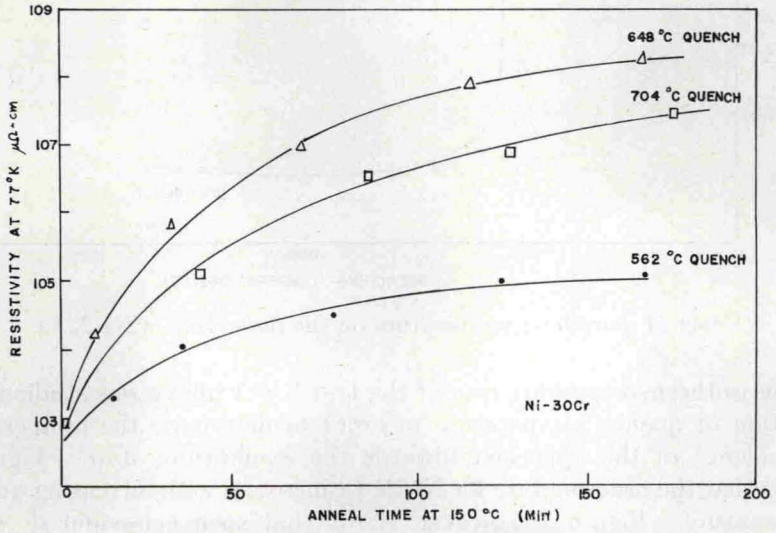
The isothermal ordering rate of the two Ni–Cr alloys was studied as a function of quench temperature in order to determine the temperature dependence of the approach towards the equilibrium state. Figure 2 shows that the ordering rate for Ni–22 Cr increases with increasing quench temperature. Figure 3, however, shows that such behaviour does not hold for Ni–30 Cr. The initial slope of each resistivity-time curve was used as a measure of the ordering rate. The ordering rate was found to (1)

Fig. 2



Effect of quenching temperature on the isothermal annealing at 150°c for Ni–22 Cr.

Fig. 3



Effect of quenching temperature on the isothermal annealing at 150°c for Ni–30 Cr.