substance: V_nO_{2n-1}: n ≥ 3
property: transport properties

V_3O_5

Resistivity and thermoelectric power: Fig. 1. At 430 K a low-order transition is seen at which the conductivity changes abruptly by a factor of 10...20.

activation energy for conductivity

E_A	0.3 eV	below T_{tr}	non-linear nature of ln ρ vs. 1/T	78C
	0.29 eV		plot ascribed in [77T] to a strongly	76K
	0.13 eV	above T_{tr}	temperature dependent band gap	78C

Hall mobility

μ_H	0.43 cm^2/V s	below T_{tr}	orientation of sample not specified	78C

lowering of T_{tr} by doping

ΔT_{tr}	0.5 K/at%	by Nb, Zn, Mg	T_{tr} is increased by + 1.1 K on	76T,
	1.2 K/at%	by Mo	doping with 20 at% ^{18}O	78T
	2 K/at%	by Mn, W		

V_4O_7

resistivity and **thermoelectric power**: Figs. 2, 3.

Immediately below T_{tr} (250 K) E_A ≈ 0.8 eV but decreases rapidly as T is lowered [70O1]. Resistivity varies with pressure as shown in Fig. 4.

T_{tr} increases by + 3.5 K on doping with 17.9 at% O [80R].

V_5O_7

resistivity and **thermoelectric power**: Figs. 5, 6.

V_6O_{11}, V_7O_{13}, V_8O_{15}, V_9O_{17}

resistivity and **thermoelectric power**: Figs. 7...10. V_7O_{13} is metallic, $m_n \approx 32\, m_0$ [73M].

summary of electrical properties of V_nO_{2n-1} compounds

(from [73K, 81N, 78C])

V_nO_{2n-1}	Characteristic of electrical conduction	T_{tr} K cooling	heating	ρ (metallic phase) Ω cm	S (metallic phase) μV K^{-1}	E_A (semiconducting phase) eV	eV
V_3O_5	(semiconductive, n-type)	430	430	$10^{-2}...10^{-3}$	– 10	0.3...0.4	0.1
V_4O_7	Metal (semiconductive, n-type)	244	250	$10^{-2}...10^{-3}$	– 10	0.08...0.1[a])	0.15
V_5O_9	Metal (semiconductive, n-type)	129	135	$10^{-2}...10^{-3}$	– 20	0.1...0.2	0.2
V_6O_{11}	Metal (semiconductive n-type)	174	177	$10^{-2}...10^{-3}$	– 10	0.12	
V_7O_{13}	Metal	–	–	10^{-3}	0...1	–	
V_8O_{15}	Metal (semiconductive, n-type)	–	70	10^{-3}	– 5...– 20	0.13	
V_9O_{17}	Metal (semiconductive, n-type)	–	79	$10^{-3}...10^{-4}$	–		

[a]) Mean value; log σ vs. $1/T$ non-linear.

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Fig. 1.

V_3O_5. Resistivity and thermoelectric power vs. reciprocal temperature of stoichiometric and Mo-doped single crystals. (*1*) V_3O_5, (*2*) V_3O_5 + 0.02 at% Mo, (*3*) V_3O_5 + 0.04 at% Mo, (*4*) V_3O_5 + 0.61 at% Mo [78C]. Orientation not specified.

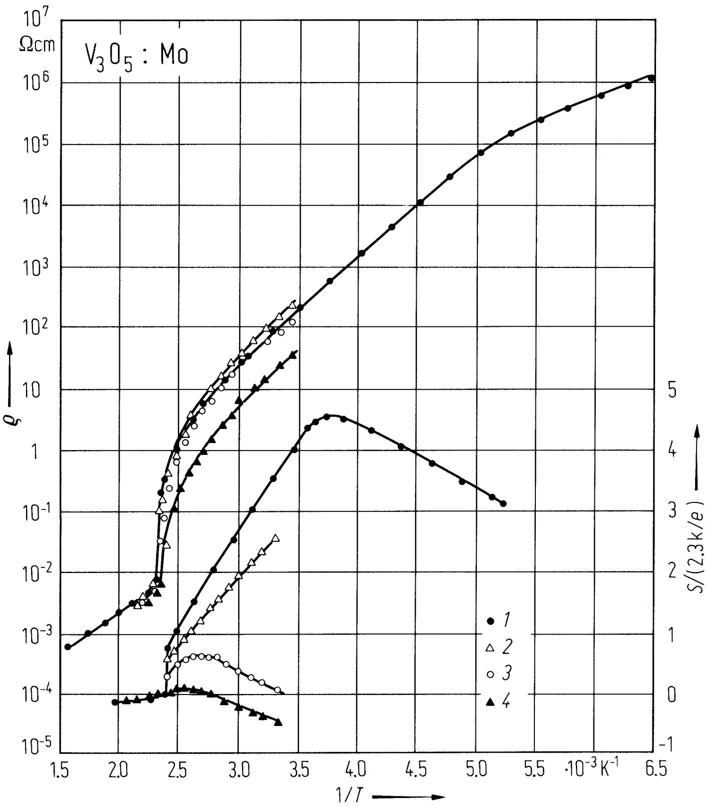


Fig. 2.

V_4O_7. Resistivity vs. (reciprocal) temperature [70O1]. Orientation not given.

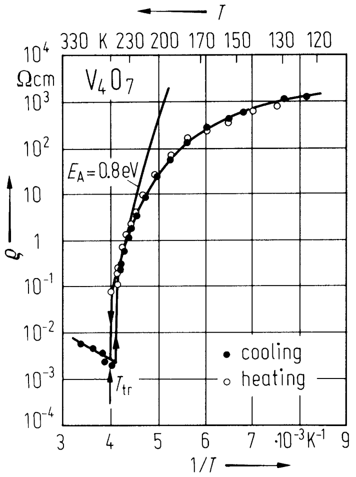


Fig. 3.

V_4O_7. Thermoelectric power vs. (reciprocal) temperature [70O1]. Orientation not given.

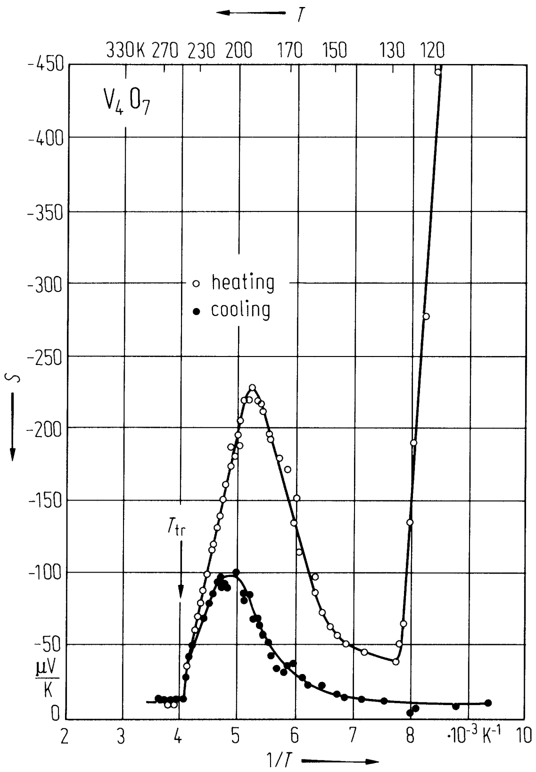


Fig. 4.

V_4O_7. Resistivity vs. temperature at different pressures. Inset shows metal-semiconductor transition temperature vs. pressure [73M]. The curve at 1 atm was obtained after pressurisation. Orientation not specified.

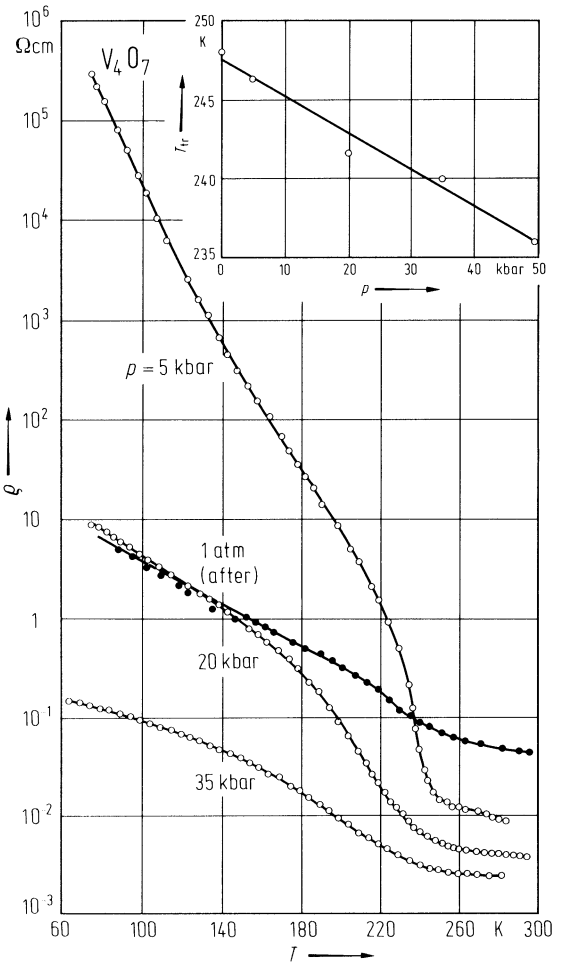


Fig. 5.

V_5O_9. Resistivity vs. (reciprocal) temperature for two samples [70O4]. Activation energies are also shown. Orientation not given.

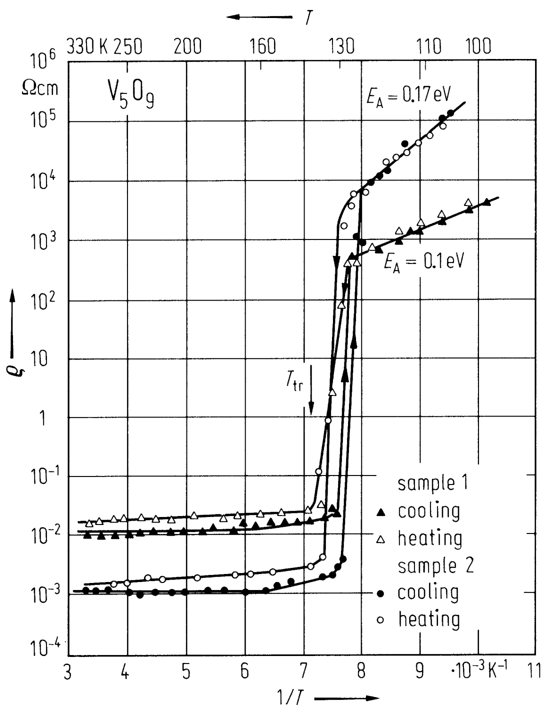


Fig. 6.

V_5O_9. Thermoelectric power vs. (reciprocal) temperature for 3 samples [70O4]. Orientation not given.

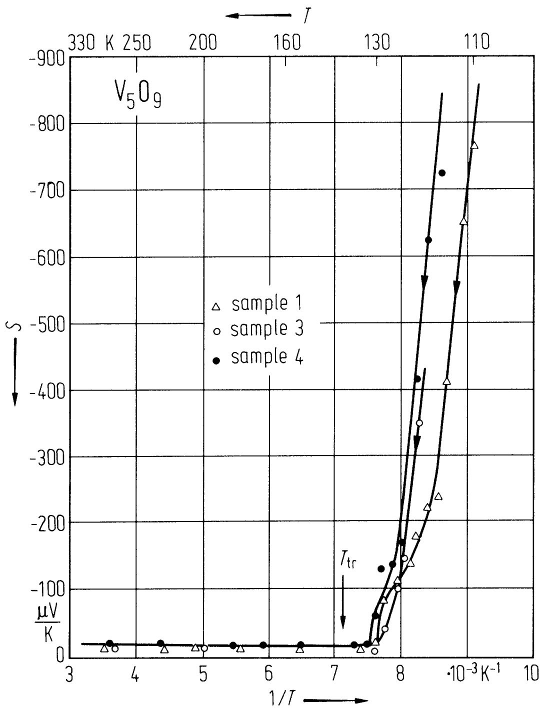
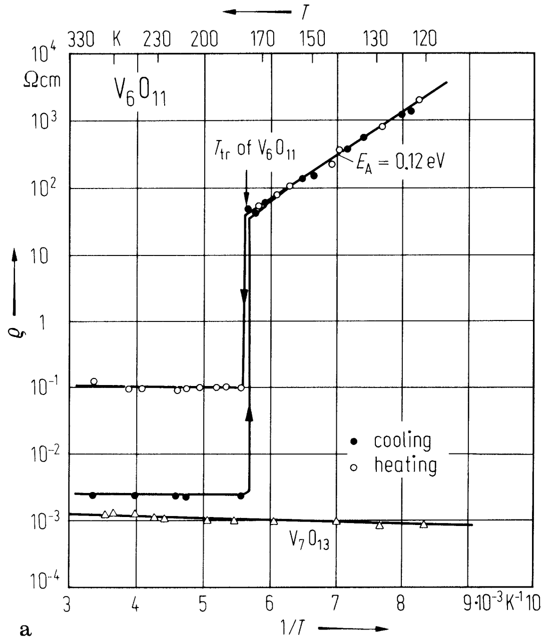


Fig. 7.

V_6O_{11} (a), V_7O_{13} (b). Resistivity vs. (reciprocal) temperature [70O2]. Orientation not given.



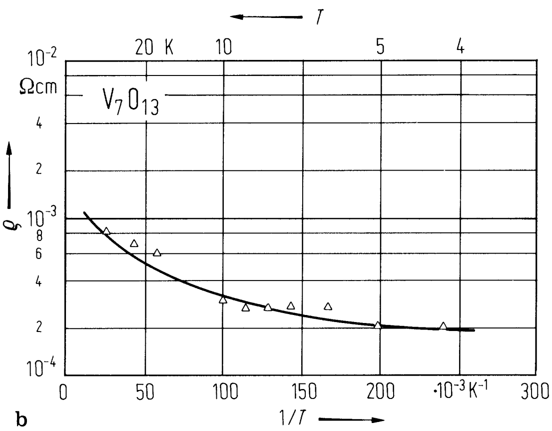


Fig. 17. V_6O_{11}(a), V_7O_{13}(b). Resistivity vs. (reciprocal) temperature [70O2]. Orientation not given.

Fig. 8.

V_6O_{11}, V_7O_{13}. Thermoelectric power vs. (reciprocal) temperature [70O2]. Orientation not given.

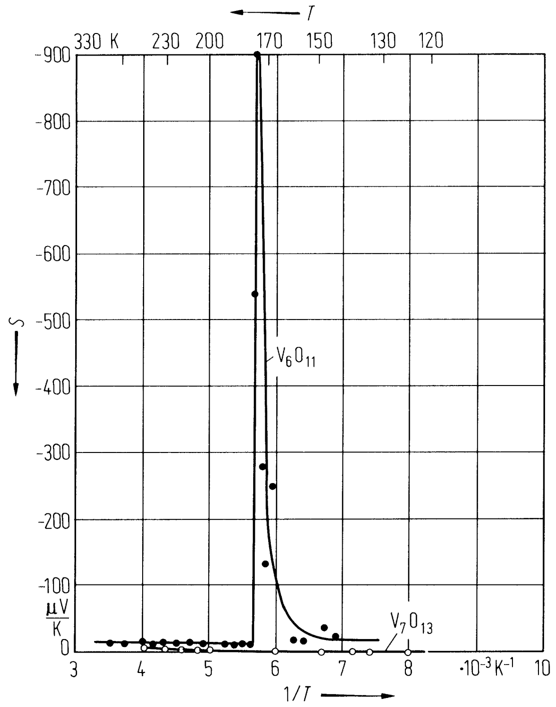


Fig. 9.

V_8O_{15}. Electrical resistivity and thermoelectric power vs. (reciprocal) temperature [70O3]. Fig. (b): ρ in the low temperature range. Orientation not given.

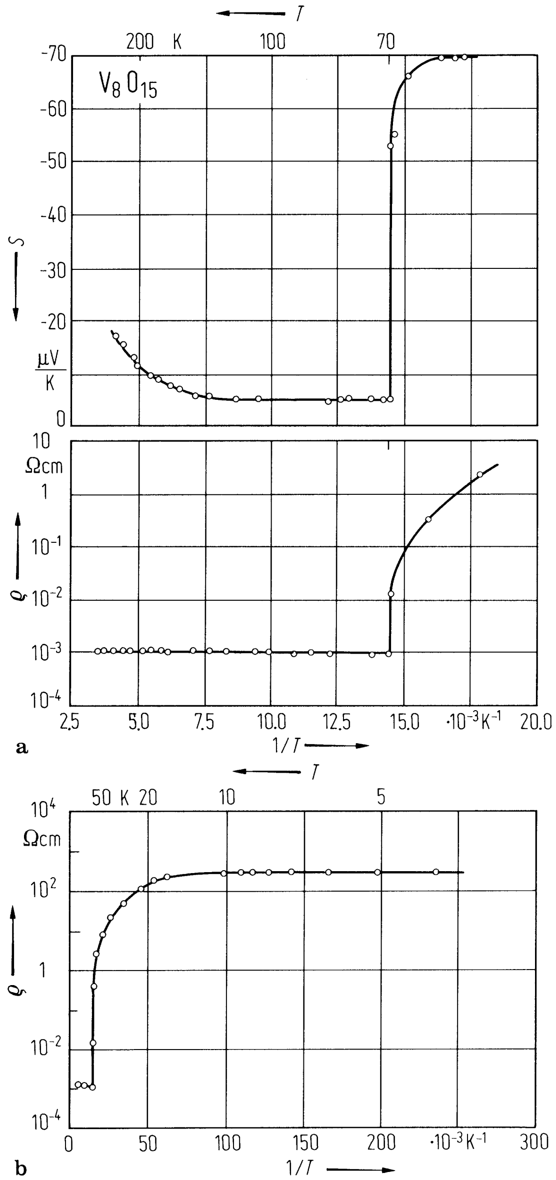


Fig. 10.

V_9O_{17}. Electrical resistivity vs. temperature. The inset shows the dependence on n of the metal- semiconductor transition and Néel temperature for V_nO_{2n-1} [81K]. Orientation not given.