ance. It allows us to under-
nperatures in a phenomeno-
p insight into the processes.

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temperatures the electrical
ative proportions of N- and
h the geometry of the Fermi
n-dispersion curves.
l scattering processes, wheth-
g, it is probably more legit-
the vibration amplitude (or
the other terms so that we
lence of the electron–phonon

lies. If we allow the pressure
from this equation:

$$2\frac{\partial \ln \theta}{\partial \ln V} \qquad (42)$$

from the Grüneisen param-

purely equilibrium measure-

$$= V\beta/\chi C_V \qquad (43)$$

ient, χ is the compressibility
nstant volume.
ge of θ with volume, and so
ne; cf. Table III. Table IV
als at 0° C. Our next problem
ln V listed in the Table. Be-
t has been done on this, there
ation of K with volume that

TABLE IV. Values of $\partial \ln K/\partial \ln V$

Metal	Experimental	Hasegawa (1964)	Theoretical (Dickey *et al.*, 1967)
Li	−2·3	−3·7	−1·1
Na	1·9	1·8	0·5
K	3·0	1·9	1·3
Rb	2·3	..	1·1
Cs	1·1†	..	−0·2

† There is considerable uncertainty in this value. According to Hasegawa (1964) some experimental values indicate it might be negative.

1. *Relationship with Thermoelectric Power*

If the electrical resistivity of a metal arises from effectively elastic scattering (e.g., impurity scattering or scattering by phonons at high temperatures), the thermoelectric power may be expressed as:

$$S = \frac{\pi^2 k^2 T}{3e}\left(\frac{\partial \ln \sigma(E)}{\partial E}\right)_{E=E_F} \qquad (44)$$

(see, for example, Mott and Jones, 1936).

This relationship expresses the fact that under these circumstances and neglecting phonon drag the thermoelectric power should be linearly proportional to the absolute temperature; this is found experimentally, at least in the region of $T \sim \theta$. Moreover, the coefficient of proportionality should depend on the variation of the conductivity of the metal with the energy of the conduction electrons at the Fermi level. If we introduce the Fermi energy, E_F, measured from the bottom of the conduction band, we may rewrite equation (44) as follows:

$$S = \frac{\pi^2 k^2 T}{3e\, E_F}\,\frac{\partial \ln \sigma(e)}{\partial \ln E} = \frac{\pi^2 k^2 T}{3e\, E_F}\,\xi \qquad (44a)$$

In this way we can obtain from measured values of S, a value for the quantity ξ, which tells us how the electrical conductivity varies with energy.

It is then found that the quantity ξ evaluated in this way for the monovalent metals is closely related to the high-temperature value of the *volume* dependence of the electrical conductivity ($\partial \ln\sigma/\partial \ln V$). If we eliminate from this volume dependence the change in the ampli-