Allred and Rochow were two chemists who came up with the Allred-Rochow Electronegativity values by taking the electrostatic force exerted by effective nuclear charge, Z_{eff}, on the valence electron. To do so, they came up with an equation:

$$\chi^{AR} = \left(\frac{3590 \times Z_{eff}}{r_{cov}^2}\right) + 0.744 \quad (5)$$

At the time, the values for the covalent radius, r_{cov}, were inaccurate. Allred and Rochow added certain perimeters so that it would more closely correspond to Pauling's electronegativity scale.

***Table 2**: Allred-Rochow Electronegativity Values*

H **2.20**																
Li **0.97**	Be **1.47**											B **2.01**	C **2.50**	N **3.07**	O **3.50**	F **4.10**
Na **1.01**	Mg **1.23**											Al **1.47**	Si **1.74**	P **2.06**	S **2.44**	Cl **2.83**
K **0.91**	Ca **1.04**	Sc **1.20**	Ti **1.32**	V **1.45**	Cr **1.56**	Mn **1.60**	Fe **1.64**	Co **1.70**	Ni **1.75**	Cu **1.75**	Zn **1.66**	Ga **1.82**	Ge **2.02**	As **2.20**	Se **2.48**	Br **2.74**
Rb **0.89**	Sr **0.99**	Y **1.11**	Zr **1.22**	Nb **1.23**	Mo **1.30**	Te **1.36**	Ru **1.42**	Rh **1.45**	Pd **1.35**	Ag **1.42**	Cd **1.46**	In **1.49**	Sn **1.72**	Sb **1.82**	Te **2.01**	I **2.21**
Cs **0.86**	Ba **0.97**	La **1.08**	Hf **1.23**	Ta **1.33**	W **1.40**	Re **1.46**	Os **1.52**	Ir **1.55**	Pt **1.44**	Au **1.42**	Hg **1.44**	Tl **1.44**	Pb **1.55**	Bi **1.67**	Po **1.76**	At **1.90**

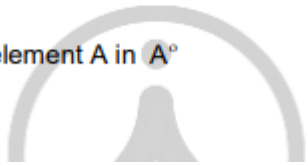
In this table, the electronegativities increases from left to right just like Pauling's scale because the Z is increasing. As we go down the group, it decreases because of the larger atomic size that increases the distance between the electrons and nucleus.

On Allred and Rochow Scale, the electronegativity is calculated by applying the formula

$$X_A = 0.744 + \frac{0.359 \times Z_{effective}}{r^2}$$

$Z_{effective}$ = Effective nuclear charge at periphery of element A

r = Covalent radius of the element A in A°



Question: What is electronegativity of Pb in Allred-Rochow scale ? Given Z(eff) of Pb for the valence electron = 5.3 , covalent radius of Pb = 1.53 angstrom.

Date/C: 02-07-2018/4062/A4988

Answer: On Allred and Rochow Seale

Electronegativity is calculated using

$$X_A = 0.744 + \frac{0.359 \times Z_{eff}}{r^2}$$

Where Z_{eff} = Effective nuclear charge at periphery of element A

r = covalent radius of the element A in A°

$$\Rightarrow X_A = 0.744 + \frac{0.359 \times 5.3}{(1.53)^2}$$

= 1.557