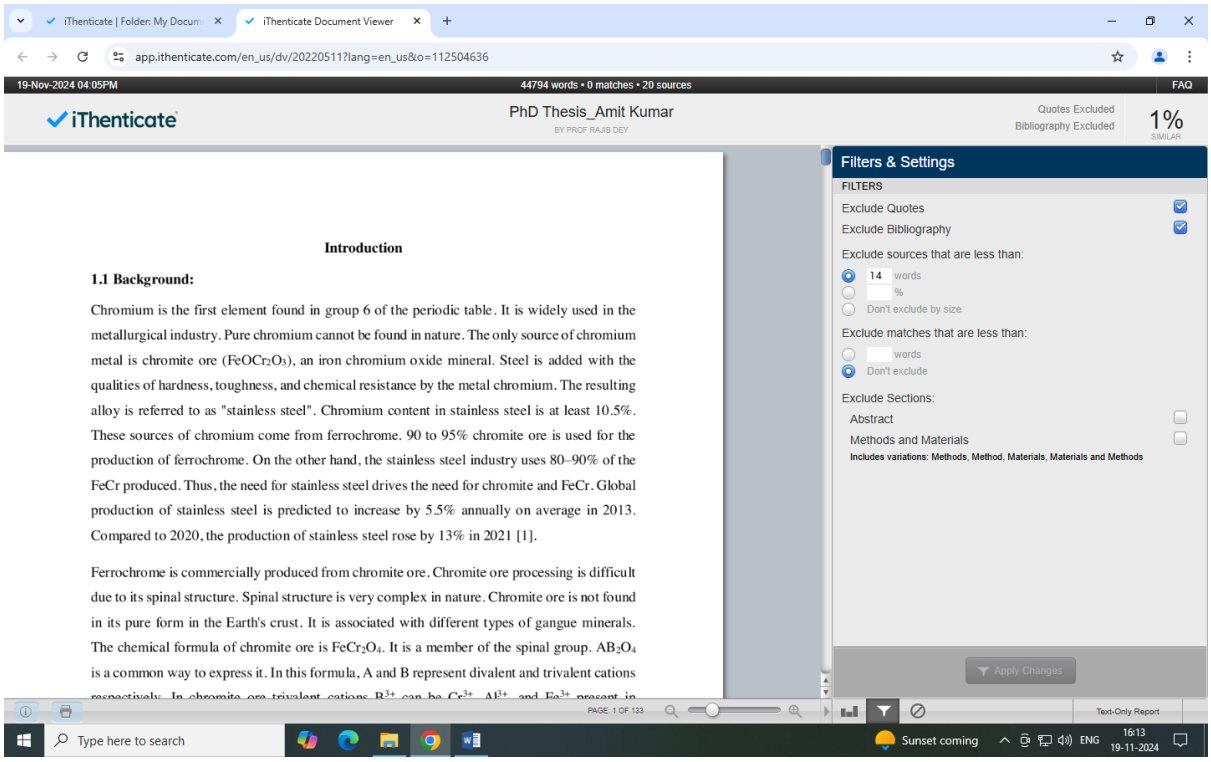
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1.1 Background:
Chromium is the first element found in group 6 of the periodic table. It is widely used in the metallurgical industry. Pure chromium cannot be found in nature. The only source of chromium metal is chromite ore ($FeOCr_2O_3$), an iron chromium oxide mineral. Steel is added with the qualities of hardness, toughness, and chemical resistance by the metal chromium. The resulting alloy is referred to as "stainless steel". Chromium content in stainless steel is at least 10.5%. These sources of chromium come from ferrochrome. 90 to 95% chromite ore is used for the production of ferrochrome. On the other hand, the stainless steel industry uses 80–90% of the FeCr produced. Thus, the need for stainless steel drives the need for chromite and FeCr. Global production of stainless steel is predicted to increase by 5.5% annually on average in 2013. Compared to 2020, the production of stainless steel rose by 13% in 2021 [1].
Ferrochrome is commercially produced from chromite ore. Chromite ore processing is difficult due to its spinal structure. Spinal structure is very complex in nature. Chromite ore is not found in its pure form in the Earth's crust. It is associated with different types of gangue minerals. The chemical formula of chromite ore is $FeCr_2O_4$. It is a member of the spinal group. AB_2O_4 is a common way to express it. In this formula, A and B represent divalent and trivalent cations
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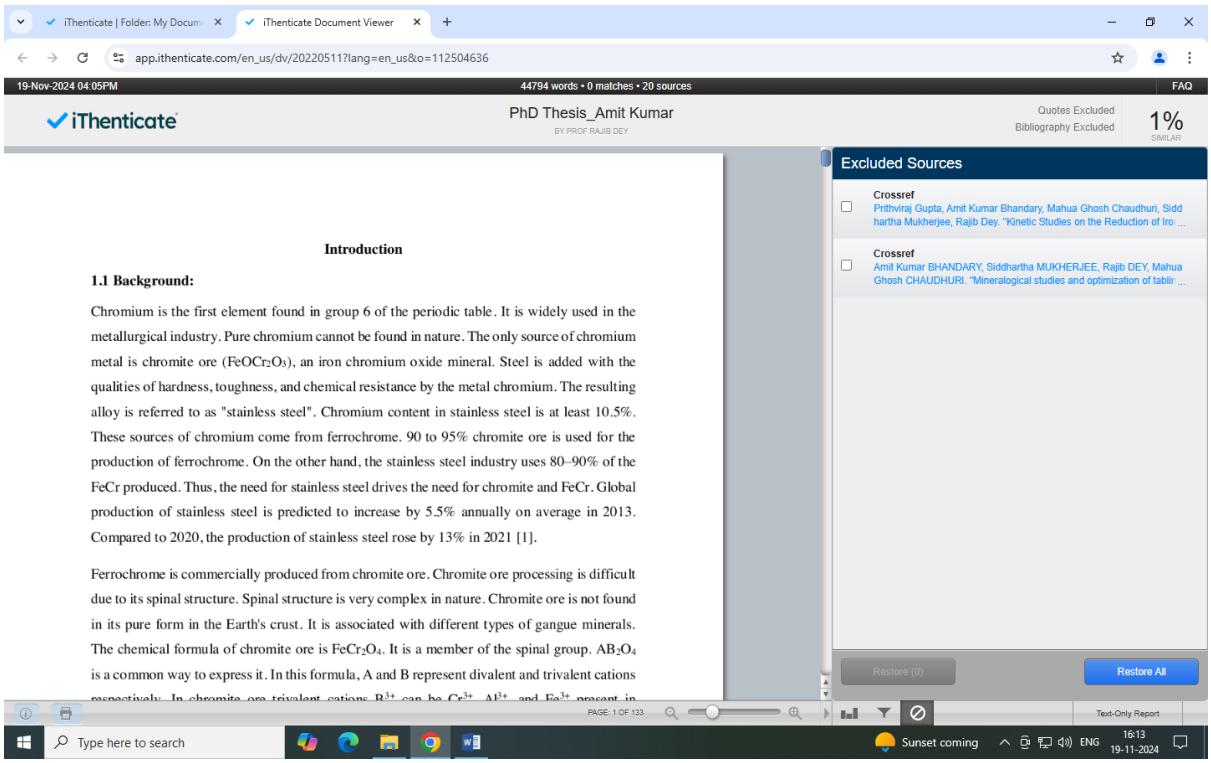
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