Claims

~~1. A compound having the formula MO_yX_z in crystalline form, wherein M is chosen from molybdenum and tungsten, X is chosen from chloro, fluoro, bromo, and iodo, and y is 1 or 2, and z is 2 or 4.~~

~~2. The compound of claim 1, wherein M is molybdenum.~~

~~3. The compound of claim 1, wherein M is tungsten.~~

~~4. The compound of claim 1, wherein M is molybdenum and X is chloro.~~

~~5. The compound of claim 1, wherein M is tungsten and X is chloro.~~

~~6~~1. A compound having ~~the~~a formula MoO_2Cl_2 in crystalline form and having ~~the x-ray crystallographic structure as shown in Figure 1.~~

~~7. The compound of claim 6, having~~ an orthorhombic crystal system, and unit cell dimensions of about

a = 13.552~~(5)~~ Å α= 90°

b = 5.456~~(2)~~ Å β= 90°

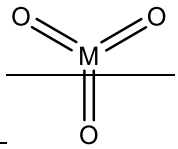
c = 5.5~~0~~8~~(2)~~ Å γ = 90.

~~8~~2. The compound of claim ~~6~~1, which exhibits a powder XRD pattern with one or more peaks at 12.94, 23.64, 26.10, 39.50, and/or 40.28 ± 0.04 degrees 2-theta.

~~9~~3. The compound of claim ~~6~~1, which has a powder XRD pattern as depicted in Figure 5.

~~10. A compound having the formula WO_2Cl_2 in crystalline form.~~

~~11. A process for preparing compounds of the formula MO_yX_z, wherein M is chosen from molybdenum and tungsten, and X is chosen from chloro, fluoro, bromo, and iodo, y is 1 or 2, and z is 2 or 4, which comprises contacting a compound of the formula~~



~~with at least one compound of the formula A-X, wherein A is chosen from elements of Group 1, Group 2, transitions metals, and main-group elements, at a temperature of about 200° to about 900° C.~~

~~12. The process of claim 11, wherein A is chosen from lithium, sodium, and potassium.~~

~~13. The process of claim 11, wherein X is chloro.~~

~~14. The process of claim 11, wherein A is chosen from magnesium, calcium, strontium, barium, beryllium, scandium, titanium, vanadium, and chromium.~~

~~15. The process of claim 11, wherein the compounds of the formula A-X are comprised of a mixture of lithium chloride and potassium chloride.~~

~~16. The process of claim 11, further comprising collecting the compound of the formula MO_yX_z as a vapor and allowing said vapor to cool, thereby forming a crystalline form of the the compound of the formula MO_yX_z.~~

~~17. The process of claim 11, wherein the compound of the formula MO_yX_z is MoO_2Cl_2.~~

~~18. The process of claim 11, wherein the compound of the formula MO_yX_z is $MoOCl_4$.~~

~~19. The process of claim 11, wherein the compound of the formula MO_yX_z is WO_2Cl_2.~~

~~20. The process of claim 11, wherein the compound of the formula MO_yX_z is $WOCl_4$.~~