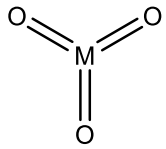
Claims

1. 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° C to about 900° C.

2. The process of claim 1, wherein A is chosen from lithium, sodium, and potassium.

3. The process of claim 1, wherein X is chloro.

4. The process of claim 1, wherein A is chosen from magnesium, calcium, strontium, barium, beryllium, scandium, titanium, vanadium, and chromium.

5. The process of claim 1, wherein the compounds of the formula A-X are comprised of a mixture of lithium chloride and potassium chloride.

6. The process of claim 1, 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 compound of the formula MO_yX_z.

7. The process of claim 1, wherein the compound of the formula MO_yX_z is MoO_2Cl_2.

8. The process of claim 1, wherein the compound of the formula MO_yX_z is $MoOCl_4$.

9. The process of claim 1, wherein the compound of the formula MO_yX_z is WO_2Cl_2.

10. The process of claim 1, wherein the compound of the formula MO_yX_z is $WOCl_4$.

11. The process of claim 1, wherein the at least one compound of the formula A-X comprises two compounds of the formula A-X which form a eutectic mixture.

12. The process of claim 1, further comprising subjecting a resulting composition to a short path distillation.

13. The process of claim 1, wherein the process is performed at below atmospheric pressure.

14. The process of claim 1, where an ampule containing the reactants is subjected to vacuum.

15. The process of claim 1, wherein the process is performed in a stainless-steel ampule.

16. The process of claim 1, wherein the process is performed at a temperature of about 475° C.

17. The process of claim 1, wherein a process temperature is greater than a melting point of A-X.

18. The process of claim 1, wherein the compound of the formula MO_yX_z comprises less than 3 parts per million of potassium, less than 2 parts per million of calcium, and less than 1 part per million each of aluminum, antimony, barium, chromium, cobalt, copper, iron, lead, lithium, magnesium, manganese, nickel, silver, sodium, tin, titanium, and vanadium.

19. The process of claim 1, wherein the compound of the formula MO_yX_z is substantially free of water.