Translate each of the sentences below into the language of predicate logic, making use of the first letters of the various capitalized words.

1. OXYGEN and ARGON are both ELEMENTS.
   \[ Eo \& Ea \]

2. Neither SALT nor RUST are ELEMENTS.
   \[ \sim Es \& \sim Er \]

3. No ELEMENTS which are GASES are COMPOUNDS.
   \[ \sim \exists x ((Ex \& Gx) \& Cx) \text{ OR } \forall x ((Ex \& Gx) \rightarrow \sim Cx) \]

4. Some GASES are not either ELEMENTS or COMPOUNDS.
   \[ \exists x (Gx \& \sim (Ex \lor Cx)) \]

5. Some ELEMENTS are HEAVIER than OXYGEN.
   \[ \exists x (Ex \& Hxo) \]

6. No ELEMENT is such that HYDROGEN is HEAVIER than it.
   \[ \sim \exists x (Ex \& Hhx) \text{ OR } \forall x (Ex \rightarrow \sim Hhx) \]

7. There are some ELEMENTS which are HEAVIER than some COMPOUNDS.
   \[ \exists x (Ex \& \exists y (Cy \& Hxy)) \]

8. The only GASES HEAVIER than ARGON are HEAVIER than OXYGEN.
   \[ \forall x ((Gx \& Hxa) \rightarrow Hxo) \]

9. Only COMPOUNDS HEAVIER than OXYGEN are HEAVIER than ARGON.
   \[ \forall x (Hxa \rightarrow (Cx \& Hxo)) \]

10. Every COMPOUND is HEAVIER than some ELEMENT or other.
    \[ \forall x (Cx \rightarrow \exists y (Ey \& Hxy)) \]

11. If no MIXTURES are ELEMENTS, then CURRY is not an ELEMENT.
\[\neg \exists x \ (Mx \& Ex) \rightarrow \neg Ec \quad \text{OR} \quad \forall x \ (Mx \rightarrow \neg Ex) \rightarrow \neg Ec\]

12. Every MIXTURE which is a GAS is HEAVIER than some ELEMENT which is not a GAS.
\[\forall x \ ((Mx \& Gx) \rightarrow \exists y ((Ey \& \neg Gy) \& Hxy))\]

13. Some ELEMENTS are HEAVIER than some COMPOUNDS.
\[\exists x \ (Ex \& \exists y (Cy \& Hxy))\]

14. Every ELEMENT HEAVIER than ARGON is HEAVIER than some COMPOUND.
\[\forall x \ ((Ex \& Hxa) \rightarrow \exists y (Cy \& Hxy))\]

15. No ELEMENT is HEAVIER than every COMPOUND.
\[\neg \exists x \ (Ex \& \forall y (Cy \rightarrow Hxy)) \quad \text{OR} \quad \forall x \ (Ex \rightarrow \exists y (Cy \& \neg Hxy))\]

16. Every COMPOUND is HEAVIER than some ELEMENT or other.
\[\forall x \ (Cx \rightarrow \exists y (Ey \& Hxy))\]

17. There is some COMPOUND which is HEAVIER than every ELEMENT.
\[\exists x \ (Cx \& \forall y (Ey \rightarrow Hxy))\]

18. No ELEMENT is HEAVIER than itself.
\[\neg \exists x \ (Ex \& Hxx) \quad \text{OR} \quad \forall x \ (Ex \rightarrow \neg Hxx)\]

19. There is some COMPOUND HEAVIER than every ELEMENT.
\[\exists x \ (Cx \& \forall y (Ey \rightarrow Hxy))\]

20. No ELEMENT HEAVIER than ARGON is HEAVIER than every ELEMENT HEAVIER than OXYGEN.
\[\neg \exists x \ ((Ex \& Hxa) \& \forall y ((Ey \& Hyo) \rightarrow Hxy)) \quad \text{OR} \quad \forall x \ ((Ex \& Hxa) \rightarrow \exists y ((Ey \& Hyo) \& \neg Hxy))\]