



?????W

?????74

????????????180(0.14)?182(26.41)? 183(14.40)?184(30.64)?186(28.41)

????:(????/??)9.53

???????183.85

???????????(ppm)0.004%

???????????(ppm)0.000092%

????????????1s22s22p63s23p63d104s24p64d104f145s25P65d56S1

?????9.53 cm/mol

?????137??

???????5d46s2

????????????m/S?4620

????Main W-4, W-2, W-1, W0, W+2, W+3, W+4, W+5, W+6

???(kJ/mol)?M - M+ 770 M+ - M2+ 1700 M2+ - M3+ 2300 M3+ - M4+ 3400 M4+ - M5+ 4600  
M5+ - M6+ 5900

???????775kJ/mol?

?????1.7?

???19.35g/cm3?

???????????

?-W????????????????????2?????????-W?????a=5.046 nm?630???????

?????

a = 316.52 pm

b = 316.52 pm

c = 316.52 pm

? = 90°

? = 90°

? = 90°

???3410±20?

???5927?

?????7.5

?????40.13±6.67kJ/mol

????847.8 kJ/mol(25?)

????823.85±20.9kJ/mol(??)

???????0.00482 l/?

?????4.55 eV

???????19.2 b

?????35000—38000 MPa(??)

?????36000Mpa

?????3.108×10<sup>11</sup>?1.579×10<sup>7</sup>t+0.344×10<sup>3</sup>t<sup>2</sup> Pa

?????4.103×10<sup>11</sup>?3.489×10<sup>7</sup>t+7.55×10<sup>3</sup>t<sup>2</sup> Pa

????2.910<sup>7</sup>7 cm/kg

??630????????????630????????????????  
????????????

????

????? ?????????????? ?????? ????

180W 0.12% 1.8E18? ? 2.516MeV 176Hf

181W ???? 121.2? ?????0.188Mev 181Ta

182W 26.50% ?????????????108???

183W 14.31% ???????????109???

184W 30.64% ??????????? 110???

185W ??? 75.1? ? 0.433MeV 185Re

186W 28.43% ???????????112???

**??Mev??????????**

**???**

??????????????74????“?”??“W”?????????Wolfram?????????(Wolframite)?????????????Wolfram??????Tungsten????????????????

????????????????????????



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**Xinkai**  
鑫凯合金



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????????????????????????9%—24%???3.8%—4.6%???1%—5%???4%—7%???0.7%—1.5%  
 ?????????????????????????700—800????????????????????600—650????????????????????????????????0.8%—  
 .2%????????????2%—2.7%????????????2%—9%????????????0.5%—1.6%????????????????????  
 ?????????????????????????5.2%—6.2%???0.68%—0.78%???0.3%—0.5%????????????????????11.5  
 —14.5%???5.5%—6.5%???11.5%—12.5%????????????????????????????

??????????

????????????????????????85%—95%??????5%—14%????????????????????????????????  
 ???1000—1100????????????????????  
 ???

??????

????????????????????3%——15%??25%——35%??45%——65%??0.5%——0.75%????  
**CoCrW**??

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**???**

????????????-????10%——40%????-??3000????????  
??

**?????**

??90%——95%??1%——6%??1%——4%????????????????——5%????????????????????????????  
????????????????

**?????**

??????K?Al?Si??ThO2??X??  
????????????????????????????????????2200——2500??  
?  
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???  
????????  
????????  
????????  
????X????????????????????????????????????  
????????[??](#)????3000????????????????????????????

**???**

??  
??  
??

**6??**

????????????520????30????130????3????????????????????????????????????  
????????????55?48%????????????????????????????????42?40%?

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????????????????????????[?????](#)

????????????????

**7??**

????????????????????????????????3410????????????????????3000????????????????????????????????  
????????????

????????????178l??  
????????????????????????????????1????????19.1????????????????????????????????“?”????????????????????????——??  
????????????1????????20??  
????????????“???”??

????????????????????????????????90%????????????????????????????????“????”????????????????????“???”??  
??  
????????????????9—17%?

??250??1000??  
????????1900??  
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?????????

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????????????“????”????????????????????????????1500??10  
00????????????????????????(?????????????)????1500????????????“????”????????????????????  
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[??????\(4\)](#)

??????? (1)

??????? (1)

?????? (1)

????? (4)

?????????????????:

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??QQ 27561901???????