(1) $Na_2WO_4 \cdot 2H_2O$ (A) + H_3PO_4 (B) $\xrightarrow[\text{water}]{\Delta}$ $\alpha,\beta\text{-}H_6P_2W_{18}O_{62}$ (C) : Reflux 5-8 hrs + then cooled

(2) (C) + KCl (E) → $\alpha,\beta\ K_6P_2W_{18}O_{62}$ (D)

(3) Recrystallize from Hot water

(4) Drying under vac @ 80°C for several hours

Note: C + D likely have similar reactivities + toxicities to A

Compound	FW	d	Quantity	mmoles	equiv	Big numbers = more hazard: Flamable category from NFPA 704 (red)	Health Category From NFPA 704 (blue)	Instability/Reactivity from NFPA 704 (yellow)	Other from NFPA 704 (white) SPECIFY	What is the most common route of exposure: 1. Inhalation; 2. Skin/Eye; 3. Swallowing	Carcinogen, teratogen, mutagen (Y/N)	Lower numbers = more hazard: Oral Toxicity category	Dermal toxicity category	Skin Irritation Category	Eye irritation category	Lachrymator (Y/N)	Explosive (Y/N)	Pyrophoric (Y/N)	Oxidizer (Y/N)	Corrosive (Y/N)
A	379.86		100g	303.16	1	0	2	0	-	1,3	N	2	2	2	2	N	N	N	N	N
B	98.004	1.88	150mL	2205	7.27	0	3	0	-	2	N	1	1	1	1	N	N	N	N	Y
C	4369.188		1.324	303.16	1						N	2	3	2	3	N	N	N		
D	4597.656		20g	4.35							N	2	3	2	3	N	N	N		
E	74.551		100		0.014	0	1	0	-	1,3	N	3	3	3	3	N	N	N	N	N

Is this a repeat experiment or a new experiment? If so, what is the Reaction Number? New

Is a standard protocol followed? (Give reference) Finke et al, Trivacant Heteropolytungstate Derivatives, Inorg. Chem, 1987, 26, 3886-3896

What are the reaction conditions and associated processes (heating, cooling, pressure, vacuum, reflux, etc?)

Reflux, cooling, recrystallization, drying

What precautions must be made for with respect to the reaction conditions and associated processes?

Acid Spill Kit, Label + Notify near the rxn property

Are there specific emergency procedures necessary for this process: Yes/No. If yes, give details:

Yes — Skin contact, remove clothing + shower immediately

Reaction and/or reagent quenching procedures. (How is this reaction stopped? What hazards are involved?)

Strong acid used, heavy metal + phosphates in the reaction

What control measures will be taken during the course of this reaction? (Check boxes)								
	Safety Glasses	X	Lab Coat	X	Fume Hood	✓	Safety Screen	✓
	Gloves (type)	Nitrile ✓		Marigolds		Other		
	Scrubbing train (type):				Other:			
Waste Disposal	Chlorinated		Hydrocarbon		Silica	Solids	Heavy Metal ✓	Other
What supervision category does it fall under? (Consult Hazard Rubric)	A		B		C		D	

Researcher Signature [signature] Date 5/23/13

Supervisor Signature [signature] Date 5/23/13

Chemical Volumes	Micro		Normal		Large
	< 0.5 L	0.5 L		2 L	> 2 L
	1	(2)	3	4	5
Hazard Recognition	None		Routine		Extreme
USE HIGHEST SCORE ONLY					
Flamable	(0)	1	2	3	4 5
Health	0	1	2	3	(4) 5
Reactivity	0	1	(2)	3	4 5
Other: Specify	0	1	2	3	4 5
Process Conditions	N/A	Sub-ambient (P < 1 atm; T < 10°C)	Ambient (P = 1 atm; 10°C < T > 40°C)		Extreme
	0	3	(1)	2 3	4 5
Explosive Hazard	N/A	No	Yes		
	(0)	0	5		
Radiation Hazard	N/A	Minimal	Normal		High
	(0)	1 2	3	4	5
Other Hazard: Specify and Score	N/A	Minimal	Normal		High
	(0)	1 2	3	4	5
Special Hazards	Inhalation Toxicity (0) 5		Reactive 0		(5)
Procedure	Detailed & Written		Routine		Under Development
	(0)		1 2 3 4		5
Personnel Preparedness and Training	Has run reaction at least 4 times		Routine (3 times=2, 2 times=3, 1 time=4)		Untrained
	0		2 3 4		(5)
Ventilation Needed	Hood Used		General Lab Only		Unventilated room
	(0)		3		5
Shielding Needed	Used				Not Used
	(0)				5
Equipment Maintenance	Regularly Performed and Documented				Never Performed
	(0)				5

Total Score 19

RECOMMENDED ACTIONS BASED ON SCORE		
LOW	< 15	Procedure can be performed unsupervised
MODERATE	15 - 25	Procedure can be performed with attention to specific hazards. Supervision by qualified undergraduate or qualified graduate student is recommended.
CAUTIOUS	26 - 30	Procedure may be perfromed with extreme caution. Supervision by faculty member is required
HIGH	30-35	Only faculty may perfrom this procedure
EXTREME	> 35	Procedure must be revised to lower the risk

EMERGENCY RESPONSE

Alarm Method	Evacuation Meeting Point	Phone Number